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LOW MACH NUMBER WIND-TUNNEL STUDY

OF AN

ADVANCED MANNED INTERCEPTOR

THESIS

GAM/AE/72-4 Robert M. Foley
CAPT USAF

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OF AN

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THESIS

Presented to the Faculty of the School of Engineering
of the Air Force Institute of Technology
Air University
in Partial Fulfillment of the
Requirements for the Degree of
Master of Science

by

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Preface

The rapid advances in aeronautics during the past 50 years have often obscured the history of this development and produced a tendency to dwell only on the here and now rather than how we arrived where we are. This thesis offered a unique opportunity to experience some of the history of aeronautical development while working with practicing engineers and technicians in the testing of a design for an Advanced Manned Interceptor. I am indebted to Mr. Ron Gord of the Flight Dynamics Laboratory for his interest and professional advice on this project. Mr. Park Doing, also of the Flight Dynamics Laboratory, provided valuable assistance in calibrating the model balance and the tunnel instrumentation. I offer my special thanks to the technicians of the AFIT 5 Foot Wind-Tunnel for their professional approach to every task and for their cheerful answers to my many questions. Finally, I must express my appreciation to Professor Harold C. Larsen for his professional advice on this project and particularly for his thought provoking presentations in the classroom. His vast experience in the field of aviation has enabled him to speak with authority on theory and practice. My association with him has given me an appreciation for the history of aeronautical development and the respective parts played by the theoreticians and engineers as well as the aircrews.

Robert M. Foley

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List of Symbols

A	aspect ratio
C_D	drag coefficient
C_{DOmin}	minimum drag coefficient
C_{Dpe}	effective parasite drag coefficient
C_1	rolling moment coefficient
C_{1_β}	derivative of rolling moment coefficient with respect to β
C_{1_ξ}	derivative of rolling moment coefficient with respect to ξ
C_L	lift coefficient
C_{Lmax}	maximum lift coefficient
C_{Lo}	lift coefficient at zero angle of attack
C_{L_α}	slope of the lift curve
$C_{L_{\delta_e}}$	derivative of lift coefficient with respect to elevator deflection
C_m	pitching moment coefficient
C_{m_u}	derivative of pitching moment coefficient with velocity
C_{m_α}	derivative of pitching moment coefficient with angle of attack

C_{m_η} ..... derivative of pitching moment coefficient with control deflection

C_n ..... yawing moment coefficient

C_{n_β} ..... derivative of yawing moment coefficient with β

C_{n_ξ} ..... derivative of yawing moment coefficient with ξ

C_x ..... axial force coefficient

C_{x_u} ..... derivative of axial force coefficient with u

C_{x_α} ..... derivative of axial force coefficient with α

C_y ..... side force coefficient

C_{y_β} ..... derivative of side force coefficient with β

C_z ..... coefficient of normal force

C_{z_u} ..... derivative of normal force with respect to u

C_{z_α} ..... derivative of normal force with respect to α

C_{z_η} ..... derivative of normal force with respect to η

e ..... airplane efficiency factor

L ..... rolling moment

M ..... pitching moment

N ..... yawing moment

q ..... dynamic pressure (lb/ft^2)

u	.....	axial velocity perterbation
X	.....	axial force
Y	.....	side force
Z	.....	normal force
α	.....	angle of attack
α_{ZL}	.....	zero lift angle of attack
β	.....	yaw angle
δ_a	.....	aileron deflection
δ_e	.....	elevator deflection
η	.....	general control deflection
ψ	.....	Euler angle indicating heading change

Abstract

This project involved the testing of a model of a projected Advance Manned Interceptor in the AFIT 5 Foot Wind-Tunnel at Wright-Patterson AFB, Ohio. The model was constructed by the McDonnell-Douglas Company and was a blended-body shape designed for Mach 4 cruising flight. The initial testing on the model in the supersonic range had been conducted by AEDC and low subsonic Mach number testing was required to complete the flight envelope.

The test program was conducted at a Mach number of .19 at a Reynolds number of 3.6×10^6. Basic performance parameters were recorded on IBM cards and the data was reduced with the FDL-8 data reduction program from the Air Force Flight Dynamics Laboratory. The reduced data supplied the parameters to determine basic lift, drag, and pitching moment characteristics of the model as well as thirteen of the static stability derivatives. This project gave an insight into the low Mach number characteristics of a blended-body shape designed for Mach 4 cruising flight.

I. Introduction

Background

The basis for this thesis is a letter from Mr. Melvin L. Buck of the Air Force Flight Dynamics Laboratory to Professor Harold C. Larsen of the Air Force Institute of Technology. In this letter, Mr. Buck described the requirement for low subsonic Mach number testing of two candidate configurations for an Advanced Manned Interceptor (Ref: 6). Models of both of these configurations had been constructed by McDonnell Aircraft and consisted of force and pressure models of each design. Although both of the configurations were designed for a similar mission profile and flight envelope, they differed markedly in appearance. The blended-body shape was chosen as the subject of this thesis.

Prior to arriving at Wright-Patterson Air Force Base, Ohio, the model had undergone extensive testing in the transonic and hypersonic tunnels of the Arnold Engineering Development Center. These tests adequately explored the high Mach number portion of the flight envelope but additional testing was required in the low Mach number region. The size of the model required a tunnel with a relatively large test section to allow an adequate range of motion in yaw and angle of attack. The AFIT 5 Foot wind-tunnel offered the

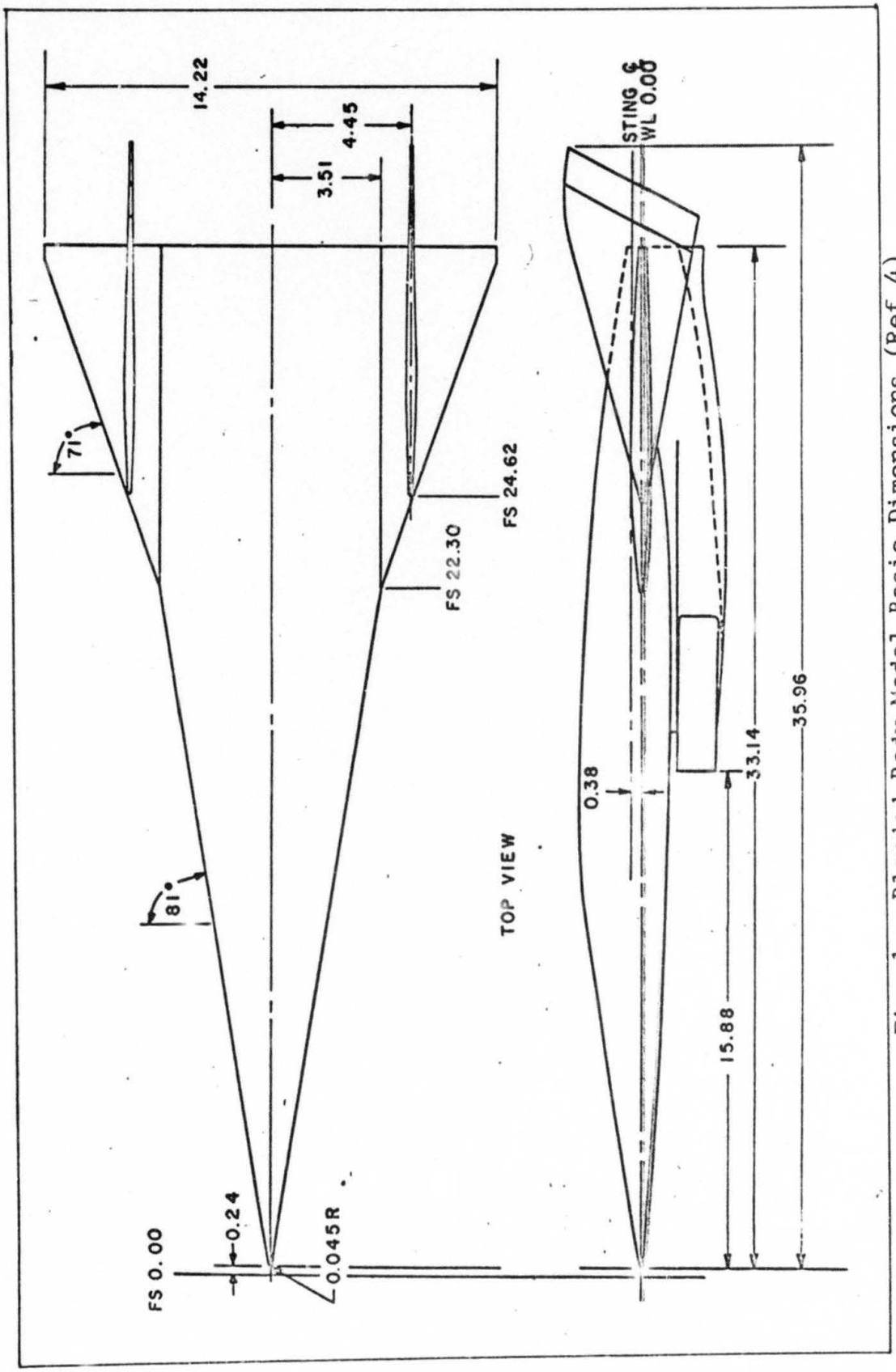

Fig. 1. Blended-Body Model Basic Dimensions (Ref 4)

size, Mach number range, and an adequate Reynolds number range to meet the test objectives.

The test objectives were primarily stimulated by the requirements of the Flight Dynamics Laboratory for a mass of data at the earliest possible date. The test schedule was established to provide data to support FDL and the requirements for this report. A series of 78 runs were agreed upon with only the first 28 directly related to the objectives of this report and the remainder devoted to the objectives of FDL. As suggested by Pope (Ref 3), sufficient data was obtained to determine C_{L_α}, C_{Lmax}, α_{ZL}, and e. Additional data was required to make some basic determinations of the static stability characteristics of the model.

A data collection configuration developed by FDL was used and a data reduction program written by FDL for previous test work on the FDL-8 hypersonic cruise vehicle was adequate for this project.

Model Description

The force model selected for this test program was the blended-body configuration. It has a double delta planform with an airfoil shaped fuselage section (Fig 1). The model is 36 inches long and has a span of 14.22 inches. The aspect ratio of the aft delta is 0.034. The low aspect ratio, low thickness to chord ratio, and high sweep angle of this model indicated possible instabilities at low Mach numbers and offered a unique opportunity to observe the effects of these parameters in the low Mach number range where they are apt to

prove most troublesome for the designer to predict and for the pilot to overcome with the flight controls.

To accomplish the full range of test objectives the model exterior was constructed of a high temperature epoxy resin (Epoxylite 6107) used as a binder for thin (.004 inch) fiberglass laminates. This material system provided a high strength retention for the anticipated temperatures encountered during the supersonic Mach number testing phase (Ref 5:5-2).

The strongback of the model was designed to accommodate the balance. Metal extensions of the strongback are used to attach the vertical fins and the outer wing panel control surfaces. These attachment points and the nose tip are the only exposed metal in the fuselage of the model. The engine duct inlets and exits are also exposed metal.

To accommodate the model strongback and sting cavity, the engine ducts were modified from a full circular duct at the aft end of the model. The duct cross-sectional area continues to expand in the flow direction to preclude choking at the higher mass flow rates and Mach numbers (Ref 5:5-25).

Each vertical fin is attached to the metal strongback of the model with four screws. Two metal plates are partially buried in the fin for added strength at these points. These plates are also used as alignment points for the outboard control surfaces (Ref 5:5-25). The alignment points provide for control surface deflections of 0, $\pm$ 5, or $\pm$ 10

degrees. These control surface deflections may be applied differentially much like the conventional elevon on many of the common delta-winged aircraft. That is, the surface acts both as an aileron to induce roll and as an elevator to produce changes in pitch. In this particular installation, the surface may also function as a flap type high lift device.

In order to scale the model properly in terms of Reynolds number, boundry layer trippers were placed just aft of the nose cap and along the upper leading edges of both delta surfaces. These trippers consisted of coarse grit particles glued directly to the model surface.

Balance Description

The model was instrumented with the Task MK XXVII internal strain gauge balance. This is a 3/4 inch balance which has been used by the Douglas Aircraft Company of the McDonnell Corporation and by AEDC in tests conducted for the Spartan project. This particular balance was selected because its small diameter minimized the amount of modification required on the model (Ref 5:5-5). The balance is pinned in place with locking screws through the top and bottom of the model. When the model and balance are attached to the tunnel sting the airloads acting on the model are transmitted to the strain gauges in the balance where they appear as electrical voltages. After calibration, these voltages provide the input parameters for the data reduction program.

Tunnel Description

The AFIT 5 Foot wind-tunnel is a venerable but very functional testing system. The system consists of an open-circuit wind-tunnel with two Liberty Engine dynamometers driving two fans, servos and their connections and controls for positioning the test subject in the test section, and a set of digital voltmeters for data collection. These voltmeters are connected to an IBM 0-26 card punch and the raw data is automaticly transcribed on a standard IBM card for each test point in the test program.

The test section of the tunnel is circular with a diameter of 5 feet and is easily accesible through large doors located on the sides of the tunnel. Also several large plexiglass viewing ports offer excellent visibility of the test subject and are adequately lighted for test photography.

For this project the first priority was the calibration of the model balance and the tunnel voltmeters. The results of the calibration were expressed as a matrix of digits for entry into the data reduction program.

Following the completion of balance calibration the first four data runs were completed to determine an optimum tunnel speed based on Reynolds number and dynamic pressure. Although Run 4 produced the highest Reynolds number ($5.2X10^6$) and dynamic pressure (100 lb/ft^2), it was concluded that the Reynolds number ($3.7X10^6$) and dynamic pressure (50 lb/ft^2) obtained during Run 2 offered the advantage of satisfying the test objectives for the remainder of the data runs while

placing a minimum strain on the tunnel fans. The remainder of the data runs involved changes in model configuration and rotations of the model about the Z-axis to induce the effects of yaw into the data. These configurations and rotations are described in Table 2 in Appendix B. During each run the angle of attack of the model was rotated through ten points ranging from -4.0 degrees to +24.0 degrees. This upper limit of 24 degrees was determined by the length of the model and the requirement to maintain separation between the model nose cap and the upper wall of the tunnel and to avoid erroneous wall flow effects.

Data Reduction

The data reduction program for this project was selected to provide adequate information to determine the model performance characteristics and static stability parameters. The FDL-8 program which was written for the AFIT 5 Foot tunnel and was converted for use with the CDC 6600 computer proved adequate in both of these areas. Difficulty was anticipated in integrating the card symbology of the IBM 0-26 with the language symbology of the FORTRAN used by the CDC 6600. However, once all positive values were expressed without a plus sign and all negative values were expressed with a minus sign, the symbologies proved completely compatible.

Appendix C contains the reduced data and list of data symbols.

Constraints

Since both the model and balance were on loan from McDonnel-Douglas for a specified period of time certain compromises in data gathering were required to meet the test objectives of this project and those of FDL.

Only three data points were available to reflect changes in yaw angle, elevator deflection, and aileron deflection. Realizing that a minimum of five points are necessary to uniquely describe a second order conic section, the fact that only three were available degrades the validity of the stability derivatives which depend on these parameters. The time available for the model and balance forced approximation techniques.

Also, the relatively low Reynolds number and dynamic pressures of the test runs tend to exagerate the effects of flow separations and the roll, pitch, and yaw couplings discussed in Chapter 3. Testing at higher Reynolds numbers and dynamic pressures would simulate a full scale model of this design more accurately.

II. Basic Parameters

An analysis of the figures in Appendix A gives many of the aerodynamic characteristics of the model. It should be remembered that these figures were derived from data relating to the whole model and not just the wings.

Figure 9 in Appendix A provides the information needed to determine $dC_L/d\alpha$. An analysis of the curve in the linear range from zero to eight degrees reveals that $dC_L/d\alpha$ is equal to 0.025/°.

Normally, C_{Lmax} would be a basic determination in a wind-tunnel test of this type but with such a small aspect ratio and a limit of 24 degrees angle of attack to avoid tunnel wall effect uncertainties, this model does not achieve C_{Lmax} during this test. An analysis of Fig 9 in Appendix A reveals a very linear curve to 16 degrees angle of attack with a slight bending at the higher angles. However, the normal lift curve with a peaking at C_{Lmax} is certainly not present. Testing at higher angles of attack in a larger tunnel will be required to determine this parameter.

The angle of attack for zero lift (α_{ZL}) is readily apparent from Fig 9 in Appendix A. Since this model has the lift curve of a symmetrical airfoil section the α_{ZL} occurs where C_L is equal to zero which gives $\alpha_{ZL} = 0$

Figure 10 in Appendix A provides the information to determine C_{DOmin}. At zero angle of attack $C_{DOmin} = 0.0312$.

The airplane efficiency factor (e) can be found from an analysis of Fig 19 in Appendix A. The Oswald Parabolic Drag Coefficient assumption is

$$C_D = C_{Dpe} + \frac{C_L^2}{\pi e A} \tag{1}$$

but Fig 19 reveals

$$C_{Dpe} = C_{DOmin} = 0.0312$$

This fact plus the linearity of the curve in Fig 19 validates the Oswald Parabolic Drag Coefficient assumption and yields

$$e = \frac{1}{\pi A\left(\frac{\Delta C_D}{\Delta C_L^2}\right)}$$

From Fig 19

$$\frac{\Delta C_D}{\Delta C_L^2} = \frac{.089-.031}{0.10} = \frac{.058}{.1} = .58$$

and $A = 1.03$

Therefore $e = \frac{1}{\pi(1.03)(.58)} = .532$

This very low airplane efficiency factor can be primarily attributed to the delta planform and very large sweep angle of the model which tend to produce a non-elliptical lift distribution. However, it should be remembered that this is an airplane efficiency factor and not a wing efficiency factor alone.

III. The Stability Derivatives

A major effort in this project was the determination of the static stability derivatives described in this chapter. Only static stability derivatives are discussed since the AFIT 5 Foot tunnel does not have a provision for measuring rates of change for any of the measured parameters.

The discussion is divided into two sections relating the derivatives to the longitudinal or lateral equations of motion as developed by Etkin (Ref 2) in Chapter 4. Etkin's development of the individual derivatives has also been followed in this chapter. Each of the derivatives has been evaluated at the reference flight condition of 6 degrees angle of attack.

Longitudinal Derivatives

To express the longitudinal derivatives it is first necessary to develop expressions for C_x and C_z. Since a wind-tunnel model and not a powered aircraft is involved, the effect of thrust is eliminated. This fact coupled with the assumption of small angles of attack yields

$$C_x = C_{L_\alpha} - C_D$$

$$C_z = -(C_L + C_{D_\alpha}) \tag{2}$$

The Derivative C_{x_α}. By definition, $C_{x_\alpha} = (\partial C_x/\partial\alpha)_o$, where the subscript zero indicates that the derivative is evaluated when the disturbance quantities are zero (Ref 2:146). From Eq (2)

$$\frac{\partial C_x}{\partial \alpha} = C_L + \frac{\partial C_L}{\partial \alpha} - \frac{\partial C_D}{\partial \alpha}$$

With the subscript zero again indicating the reference flight condition with $\alpha=6°$, we have

$$C_{x_\alpha} = \left(\frac{\partial C_x}{\partial \alpha}\right)_o = C_{L_o} - \left(\frac{\partial C_D}{\partial \alpha}\right)_o \tag{3}$$

However, when the drag is expressed by a parabolic polar in the form

$$C_D = C_{Dmin} + C_L^2/\pi eA$$

we have $$C_{x_\alpha} = C_{L_o} - \frac{2C_{L_o}}{\pi eA} C_{L_\alpha} \tag{4}$$

Figure 9 in Appendix A indicates that C_{L_o} is equal to .148 at 6 degrees angle of attack. Using this angle of attack as the reference speed condition yields

$$C_{x_\alpha} = .148 - \frac{(2)(.148)(1.431)}{\pi\ (1.03)(.532)}$$

$$C_{x_\alpha} = 0.017$$

The Derivative C_{z_α}. By definition,

$$C_{z_\alpha} = \left(\frac{\partial C_z}{\partial \alpha}\right)_o$$

with the derivative again evaluated when the disturbance quantity is zero (Ref 2:147). From Eq (2) we have

$$\frac{\partial C_z}{\partial \alpha} = - (C_{L_\alpha} + C_D + \alpha \frac{\partial C_D}{\partial \alpha})$$

Therefore $$C_{z_\alpha} = - (C_{L_\alpha} + C_{D_o}) \qquad (5)$$

Reference to Figs 9 and 10 in Appendix A indicates that

$$C_{D_o} << C_{L_\alpha}$$

at 6 degrees angle of attack. Therefore, as in Etkin,

$$C_{z_\alpha} \doteq - C_{L_\alpha} = - 1.431$$

The Derivative C_{m_α}. By definition

$$C_{m_\alpha} = \frac{\partial C_m}{\partial \alpha}$$

In the linear range of Fig 11 in Appendix A, C_{m_α} may be approximated by the relationship $\frac{\Delta C_m}{\Delta \alpha}$. Therefore

$$C_{m_\alpha} = \frac{\Delta C_m}{\Delta \alpha} = \frac{-.0095}{5.0°}$$

and $$C_{m_\alpha} = -0.1089$$

The u Derivatives. Since the tunnel runs of this project were all conducted in the low subsonic Mach number range, the u derivatives will all be approximately equal to zero. We have

$$C_{x_u} = - M\frac{\partial C_D}{\partial M} \tag{6}$$

$$C_{z_u} = - M\frac{\partial C_L}{\partial M} \tag{7}$$

and

$$C_{m_u} = M\frac{\partial C_m}{\partial M} + \rho u_o^2 \frac{\partial C_m}{\partial pd} \tag{8}$$

In the low subsonic Mach number range,

$$\frac{\partial C_D}{\partial M} = \frac{\partial C_L}{\partial M} = \frac{\partial C_m}{\partial M} = 0$$

and, as is characteristic of an aircraft with high sweepback and a low aspect ratio operating at a low subsonic Mach number, $\partial C_m/\partial pd \approx 0$ (Ref 2:152).

Therefore,

$$C_{x_u} = 0.0$$

$$C_{z_u} = 0.0$$

$$C_{m_u} \triangleq 0.0$$

The u Derivatives. Since the tunnel runs of this project were all conducted in the low subsonic Mach number range, the u derivatives will all be approximately equal to zero. We have

$$C_{x_u} = - M\frac{\partial C_D}{\partial M} \tag{6}$$

$$C_{z_u} = - M\frac{\partial C_L}{\partial M} \tag{7}$$

and

$$C_{m_u} = M\frac{\partial C_m}{\partial M} + \rho u_o^2 \frac{\partial C_m}{\partial pd} \tag{8}$$

In the low subsonic Mach number range,

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and, as is characteristic of an aircraft with high sweepback and a low aspect ratio operating at a low subsonic Mach number, $\partial C_m/\partial pd \approx 0$ (Ref 2:152).

Therefore,

$$C_{x_u} = 0.0$$

$$C_{z_u} = 0.0$$

$$C_{m_u} \doteq 0.0$$

The Derivative C_{z_η} . By definition, C_{z_η} is the change in C_z due to elevator deflections. Although no true elevator exists on this model, the moveable control surfaces on each wing tip function both as ailerons and elevators. Therefore, when they are simultaneously deflected in the same magnitude and direction, they are considered as elevators. We have

$$C_{z_\eta} = \left(\frac{\partial C_z}{\partial \eta}\right)_o = - \left(\frac{\partial C_L}{\partial \eta}\right)_o$$

but $\partial C_L/\partial \eta$ is identical with the control parameter $C_{L_{\delta_E}}$ (Ref 2:166). Therefore

$$C_{z_\eta} = - C_{L_{\delta_E}} \tag{9}$$

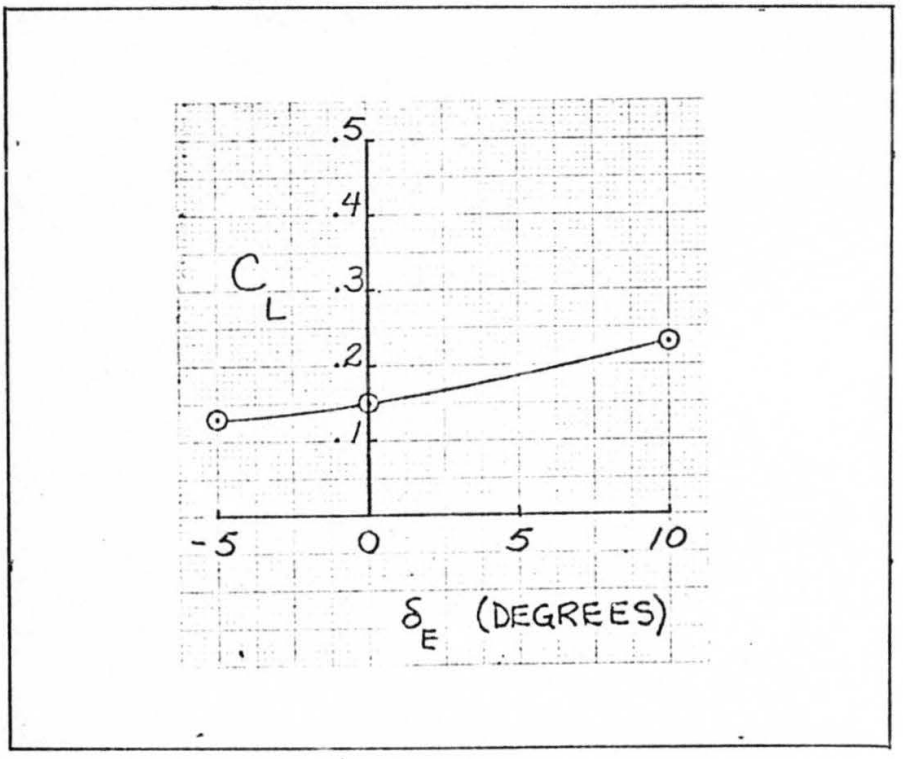

Fig. 2. Effect of Elevator Deflection On Lift

From Fig 12 in Appendix A with the small angle of attack approximation and the assumption of linearity at $\alpha = 6°$ we obtain Fig 2 above. Therefore, $C_{z_\eta} = -0.458$.

Figure 9 indicates that C_{L_α} is linear to 12 degrees angle of attack and only slightly curved between 12 and 24 degrees. Figure 12 indicates that elevator deflection influences the lift coefficient at a particular angle of attack but does not affect C_{L_α} and in fact shows that C_{L_α} is constant in the linear range. Beyond 16 degrees angle of attack the effect of elevator deflection is obscured by flow separations and tip stalling.

The Derivative C_{m_η}. An analysis similar to that of C_{z_η} yields

$$C_{m_\eta} = C_{m_{\delta_E}} \tag{10}$$

From Fig 13 in Appendix A with the small angle of attack approximation and the assumption of linearity at $\alpha = 6°$ we obtain Fig 3 below. If we attribute the slight bow in the curve to the errors of engineering accuracy and the influences of higher order terms we may approximate the data between elevator deflections of $-5°$ and $+10°$ by a straight line. This approximation yields

$$C_{m_\eta} = \left(\frac{\partial C_m}{\partial \eta}\right)_o = \frac{\Delta C_m}{\Delta \delta_E}$$

$$C_{m_\eta} = \frac{-.0057}{5.0} = -0.0687$$

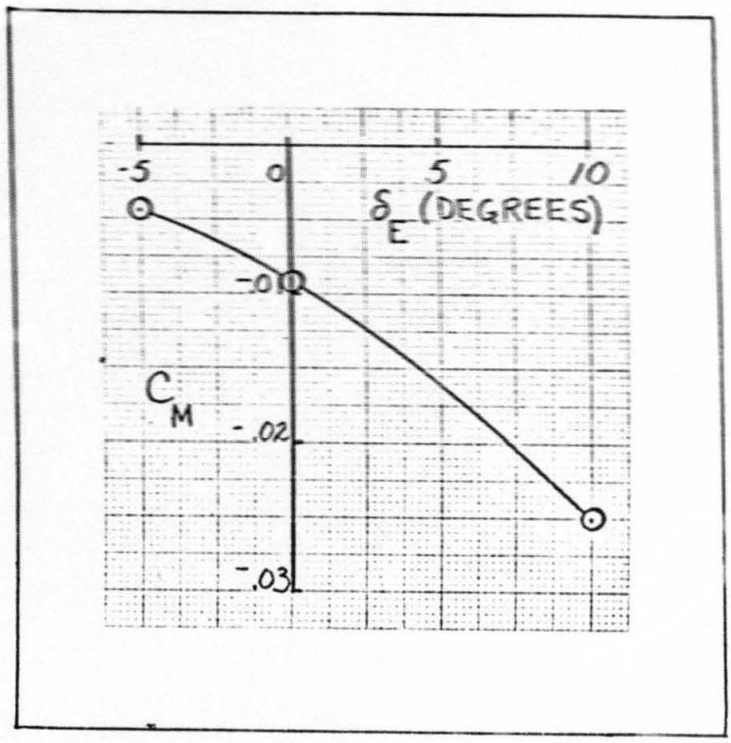

Fig. 3. Effect of Elevator Deflection On Pitching Moment.

The pitching moment depicted in Fig 11 of Appendix A is a very important characteristic of this model. With zero control deflection it is important to note that C_{mo} is positive while C_{m_α} is negative indicating that the model is stable in pitch to approximately 16 degrees angle of attack. Beyond 16 degrees angle of attack the slope of the pitching moment coefficient is positive indicating a tendency for the model to "pitch-up" point lowers to approximately 12 degrees angle of attack with 10 degrees of positive elevator deflection. This fact would certainly limit the performance of an actual aircraft to angles of attack below these "pitch-up" points and would confine the aircraft to an angle of attack region of very low lift coefficients.

The Lateral Derivatives

Although theoretical and emperical techniques are available to determine the lateral stability derivatives, experimental techniques are generally far more practical. Since this model has a very small aspect ratio and highly swept wings to achieve good performance in the Mach 4 range, we can expect its low Mach number stability to be degraded since these characteristics tend to be destabilizing at the low Mach numbers and high angles of attack encountered in this project.

The lateral derivatives in this chapter are again confined to static stability derivatives since the tunnel does not have rate measuring devices. Graphical means were used extensively in these determinations.

The Derivative C_{y_β}. This is the side-force derivative which describes the force that acts in the y direction (right) when the aircraft has a positive β (sideslip to the right). C_{y_β} is usually negative, and frequently small enough to be neglected entirely. The main contributions are those of the body and vertical tail (Ref 2:167). As in the longitudinal derivatives, Fig 4 below was obtained by determining values of C_y with changes in β at a constant angle of attack of 6°. These changes are illustrated in Fig 14 of Appendix A.

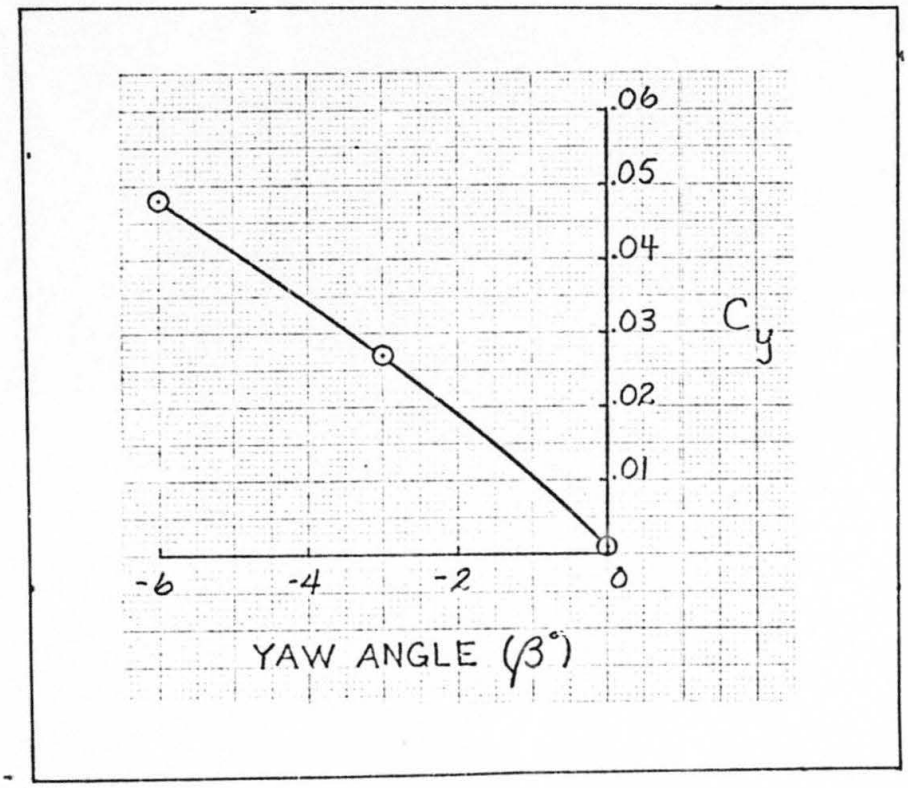

Fig. 4. Effect of Yaw Angle on Side Force.

If the slight curve in the figure above is again assumed to be due to engineering inaccuracies and the influence of higher order terms, we may approximate the curve by a straight line and obtain

$$C_{y_\beta} = \left(\frac{\partial C_y}{\partial \beta}\right)_o = \frac{\Delta C_y}{\Delta \beta}$$

$$C_{y_\beta} = \frac{-.047}{6.0} = -0.446 \qquad (11)$$

Figure 14 of Appendix A indicates that the side force coefficient is a function of angle of attack as well as yaw angle particularly in the non-linear range above 12 degrees angle of attack.

The Derivative C_{l_β}. The tendency of an aircraft to maintain a zero bank angle is related to the derivative C_{l_β} which is known as the dihedral effect. Figure 5 below describes the influence of yaw angle on the rolling moment for this aircraft. Again, the change in rolling moment with the change in yaw angle was computed at 6 degrees angle of attack. The resulting straight line allows computation of the derivative from the following

$$C_{l_\beta} = \frac{\Delta C_l}{\Delta \beta}$$

$$C_{l_\beta} = -0.03495 \qquad (12)$$

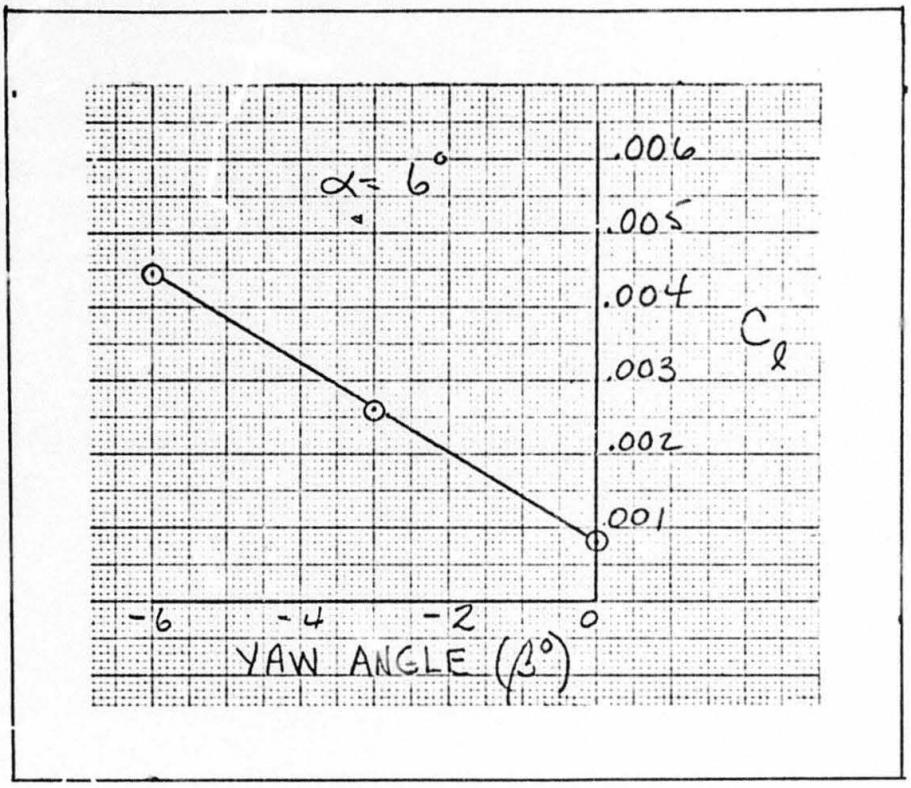

Fig. 5. Dihedral Effect.

Figure 15 indicates that the rolling moment is also a function of angle of attack as well as yaw angle. At minus 2.8 degrees angle of attack a reversal in the influence of yaw angle occurs. The steep slopes of these curves indicate a strong pitch and roll coupling in this model particularly at angles of attack above 12 degrees.

The Derivative C_{n_β}. C_{n_β} is known as the weathercock stability derivative. It describes the tendency of an aircraft to maintain its directional attitude. The main contributions to this derivative are from the fuselage and the vertical tail. Figure 6 below was obtained from Fig 16 in

Appendix A by observing the changes in C_n with changes in β while angle of attack was held constant at 6 degrees. The resulting straight line allows the following computation

$$C_{n_\beta} = \frac{\Delta C_n}{\Delta \beta}$$

$$C_{n_\beta} = 0.03205 \qquad (13)$$

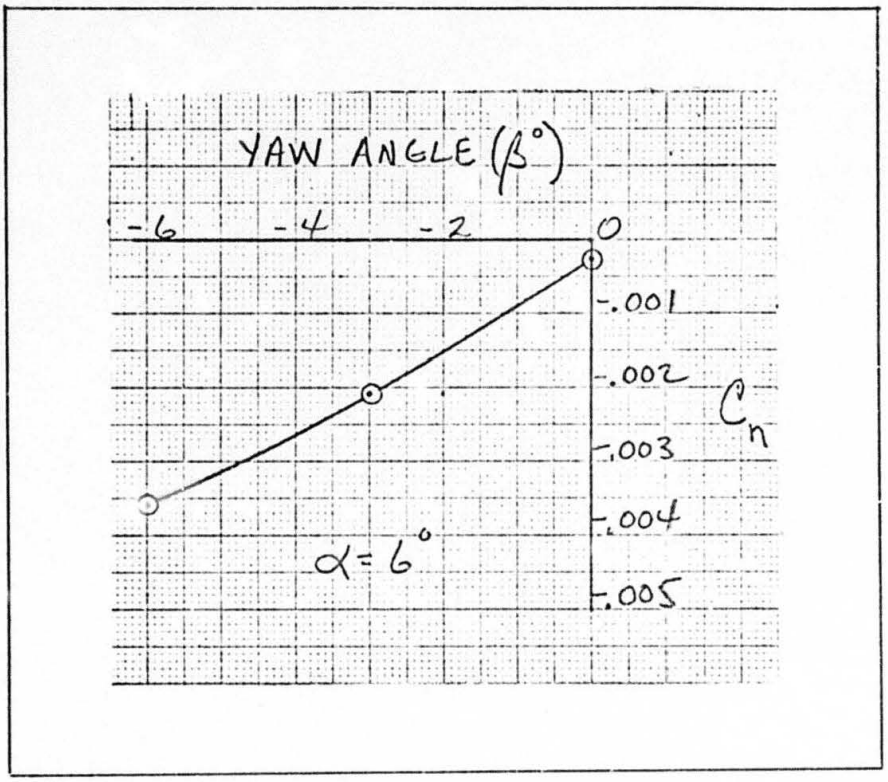

Fig. 6. Weathercock Stability Derivative

Figure 16 of Appendix A indicates strong pitch and yaw coupling. Above 10 degrees angle of attack the slope of the curve becomes positive indicating that the restoring moment is weakining. When the model is rotated in angle of attack

to the point where the yawing moment becomes positive while the yaw angle is negative a horizontal analogy to the "pitch-up" problem discussed earlier is produced. That is, the model tends to increase its yaw displacement.

The Derivative C_{l_ξ}. The rolling moment due to the deflection of ailerons was obtained by deflecting the model control surfaces an equal amount in opposite directions. In this respect the control surfaces functioned as ailerons rather than elevators as in earlier discussions. Figure 7 below was obtained from Fig 17 in Appendix A by holding the angle of attack fixed at 6 degrees while varying the aileron deflections. Allowing for engineering accuracy and approximating the higher order curve with a straight line gives the following approximation for this derivative

$$C_{l_\xi} = \frac{\Delta C_l}{\Delta \xi} = -0.409 \qquad (14)$$

Figure 17 of Appendix A indicates that the rolling moment is a function of angle of attack as well as aileron deflection. Beyond 12 degrees angle of attack the slopes of the rolling moment coefficient versus angle of attack curves become positive indicating a weakening in aileron effectiveness in this region. Again roll and pitch coupling is indicated particularly at angles of attack above 12 degrees.

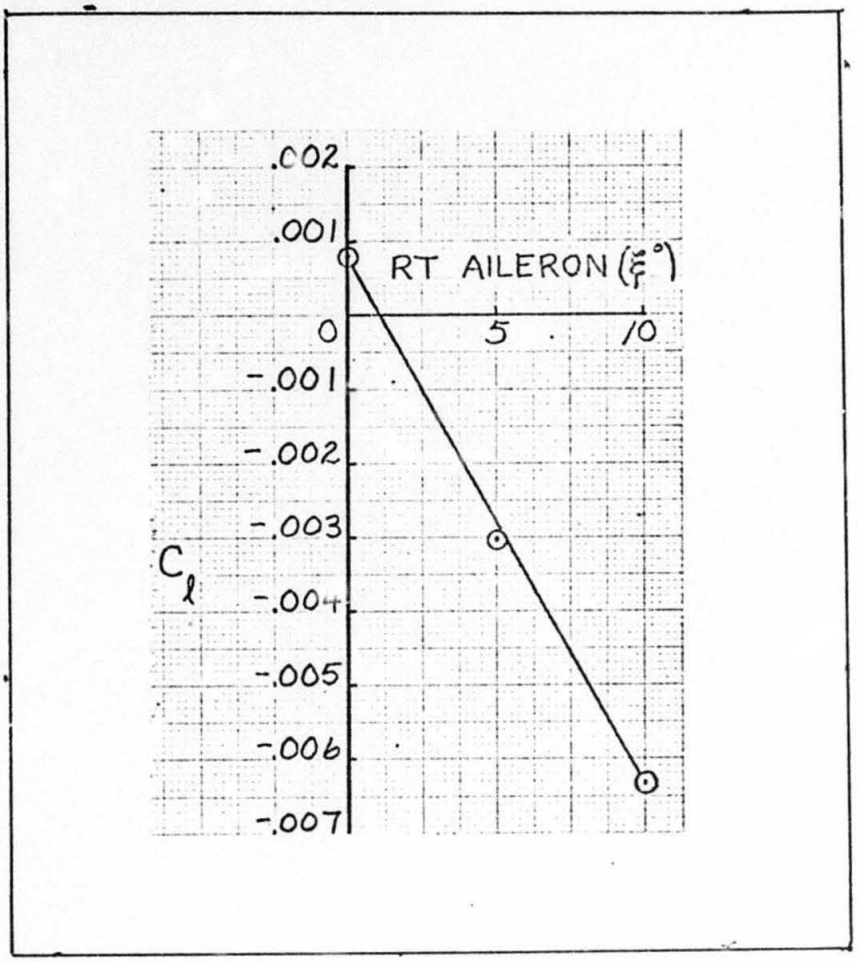

Fig. 7. Rolling Moment Due to Aileron

The Derivative C_{n_ξ}. The yawing moment due to aileron deflection was obtained by holding the angle of attack constant at 6 degrees while varying the aileron deflection angle as described by Fig 18 in Appendix A. The resulting curve depicted in Fig 8 below proved to be the least linear of any of the derivatives in this project. However, a linear estimation of the derivative between aileron deflections of zero to ten degrees reveals the following

$$C_{n_\xi} = \frac{\Delta C_n}{\Delta \xi} \tag{15}$$

$$C_{n_\xi} = -0.01089 \quad (0<\xi<+5°)$$

$$C_{n_\xi} = -0.001144 \quad (+5<\xi<+10°)$$

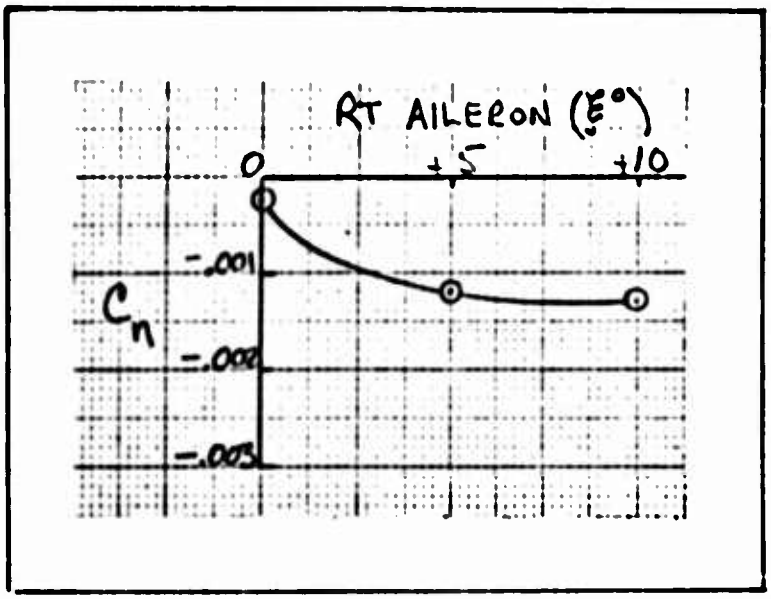

Fig. 8. Yawing Moment Due to Aileron.

Figure 18 of Appendix A indicates a definite adverse yaw characteristic at the higher angles of attack. Above 12 degrees angle of attack the yawing moment is positive while the rolling moment is negative. That is, the nose of the model tends to yaw right while the model tends to roll left. This phenomenon is aggravated at higher angles of attack.

An estimation of the curves in Fig 18 of Appendix A serves as an example for estimating any of the curves in

Appendix A. At β=-3°

$$C_y = .024 + \frac{(.031-.024)}{16}\alpha$$

but $C_L = .025\,\alpha$

and $\alpha = \frac{C_L}{.025}$

Therefore $$C_y = .024 + \frac{.009}{16}\left(\frac{C_L}{.025}\right) = .024 + .0225\,C_L$$

At β= -6°

$$C_y = .041 + .03625\,C_L$$

And at β= 0°

$$C_y = 0.0 + .00833\,C_L$$

One can now fit a curve through the constants as

$$C_y = a(\beta) + b(\beta)\,C_L \qquad (16)$$

with $$a(\beta) = c\beta + d\beta^2$$

Substitution yields

$$.024 = 3c + 9d$$

$$.041 = 6c + 36d$$

Therefore

$$c = \frac{\begin{vmatrix} .024 & 9 \\ .041 & 36 \end{vmatrix}}{\begin{vmatrix} 3 & 9 \\ 6 & 36 \end{vmatrix}} = .00917$$

$$d = \frac{\begin{vmatrix} 3 & .024 \\ 6 & .041 \end{vmatrix}}{\begin{vmatrix} 3 & 9 \\ 6 & 36 \end{vmatrix}} = -.000389$$

and $$a(\beta) = .00917\beta - .000389\beta^2 \qquad (17)$$

$$b(\beta) = .00833 + f\beta + g\beta^2$$

Expressions for f and g are found from

$$.01467 = 3f + 9g$$

$$.02792 = 6f + 36g$$

Therefore

$$f = \frac{\begin{vmatrix} .01467 & 9 \\ .02792 & 36 \end{vmatrix}}{54} = .0056$$

$$g = \frac{\begin{vmatrix} 3 & .01467 \\ 9 & .02792 \end{vmatrix}}{54} = -.00089$$

and $$b(\beta) = .00833 + .0056\beta - .00089\beta^2 \qquad (18)$$

Substituting the values for the constants in Eq 17 and 18 in Eq 16 yields

$$C_{y_\beta} = .00917\beta - .000389\beta^2 + (.00833 + .0056\beta - .00089\beta^2)C_L \qquad (19)$$

Equation 19 is a curve fit to the data expressed in Fig 18 of Appendix A for $C_L \leq .3$. For $\beta = -3$ and $C_L = 0.3$

$$C_{y_\beta} = .0315$$

which compares with the value

$$C_{y_\beta} = .03$$

obtained from the appropriate curve in Fig 18.

This curve fitting technique can be applied to the other curves in this chapter and to those presented in Appendix A to estimate their values.

Table I

Stability Derivative Summary
(Computed at 6° Angle of Attack)

Longitudinal Derivatives

C_{x_α}	=	0.017
C_{z_α}	=	-1.431
C_{m_α}	=	-0.1089
C_{x_u}	=	0.0
C_{z_u}	=	0.0
C_{m_u}	=	0.0
C_{x_η}	=	-0.458
C_{z_η}	=	-0.0687

Lateral Derivatives

C_{y_β}	=	-0.446
C_{l_β}	=	-0.03495
C_{n_β}	=	0.03205
C_{l_ξ}	=	-0.409
C_{n_ξ}	=	-0.01089 $(0<\xi<+5)$
	=	-0.001144 $(5<\xi<+10)$

IV. Conclusions and Recommendations

Based on the information presented in Chapters 2 and 3 the following conclusions are warrented:

1. The model will "pitch-up" at an angle of attack below the stalling angle of attack. Therefore, C_{m_α} is the limiting characteristic in pitch rather than C_{Lmax}.
2. The drag characteristics of the model conform to the Oswald Parabolic Drag Polar approximation.
3. The delta planform and large sweep angle of the model contribute to a low airplane efficiency factor (e) of 0.532.
4. Linear approximations are valid for the longitudinal derivatives to angles of attack of 12 degrees.
5. The model exhibits roll, pitch, and yaw coupling at angles of attack above 12 degrees.
6. Above 10 degrees angle of attack the model tends to increase yaw displacement due to the reduction of restoring moment as angle of attack increases.
7. Above 12 degrees angle of attack the model exhibits a strong "adverse" yaw characteristic.

The constraints of time and model configuration discussed in the introduction and the conclusions presented above lead to the following recommendations:

1. The testing envelope should be expanded to Reynolds numbers of 50 X 10^6 and dynamic pressures and Mach numbers approaching the transonic region by using a variable density tunnel.
2. The angle of attack region above 24 degrees should be investigated to determine C_{Lmax}.
3. A larger range of yaw displacement should be investigated to include both positive and negative displacements. This would lead to a more accurate estimation of the β derivatives.
4. A model of this configuration with a wider range and smaller increment control deflection should be built and tested to more accurately estimate the control deflection derivatives.
5. Oil flow studies should be made to determine the cause of the "pitch-up" condition at 16 degrees angle of attack.
6. Model configurations with high lift devices to improve the lift coefficient and delay the "pitch-up" tendency should be investigated.
7. Methods of reducing the pitch, roll, and yaw coupling of the model should be investigated.

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Appendix A

The figures contained in this appendix were obtained from the data sheets in Appendix C. They are the basis for the performance and static stability analyses of Chapters two and three.

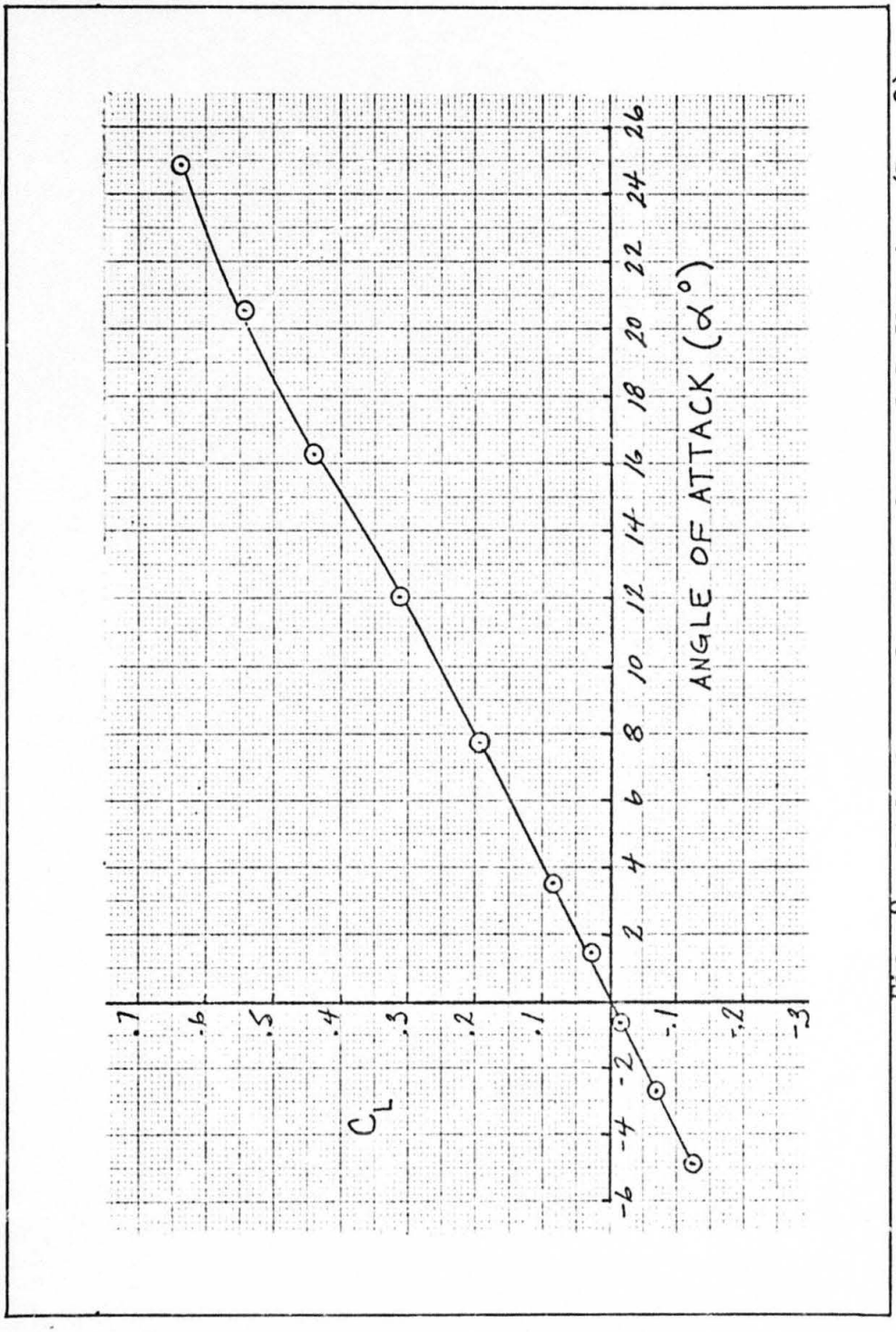

Fig. 9. Lift Curve for Zero Control Deflection (Run 2).

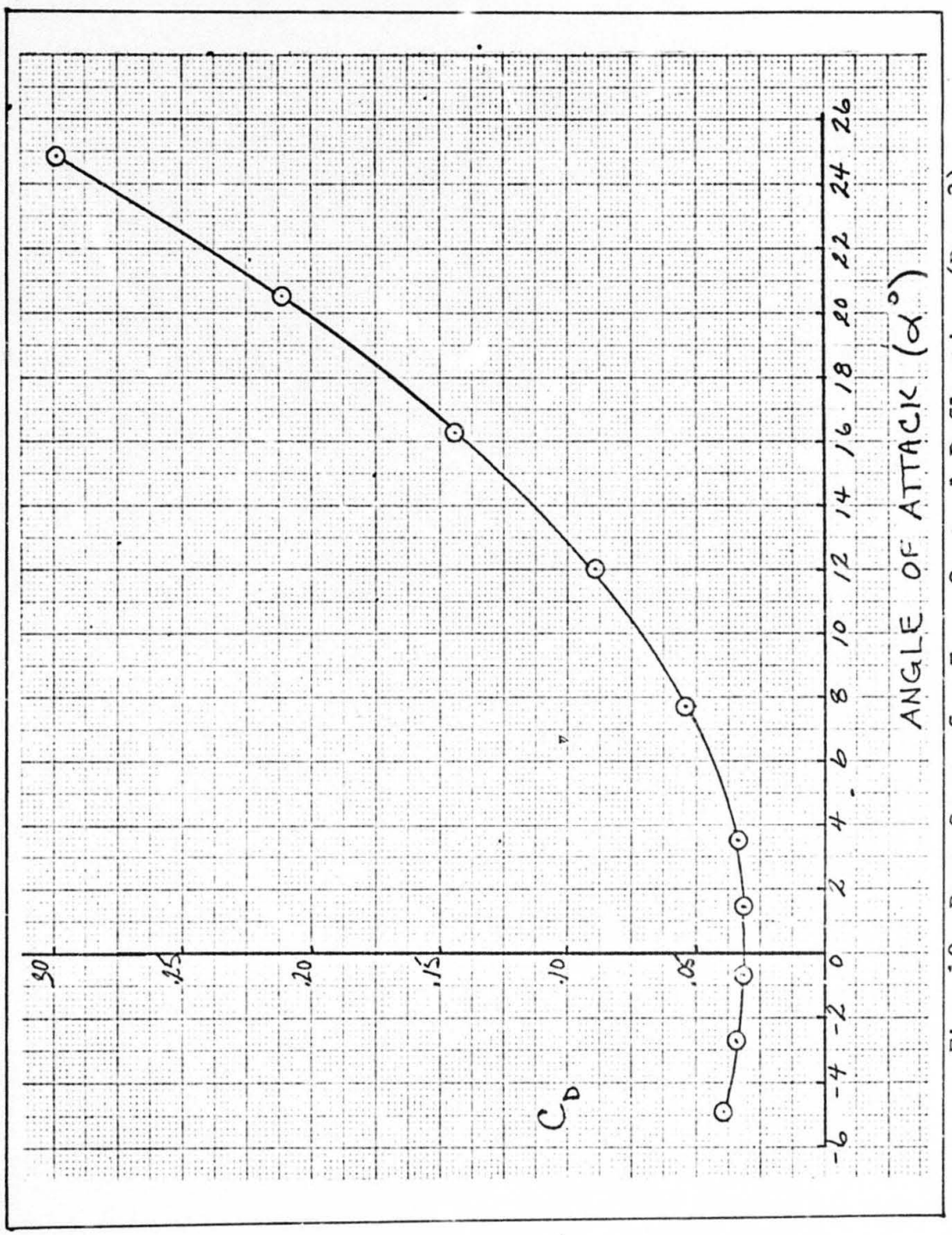

Fig. 10. Drag Curve for Zero Control Deflection (Run 2).

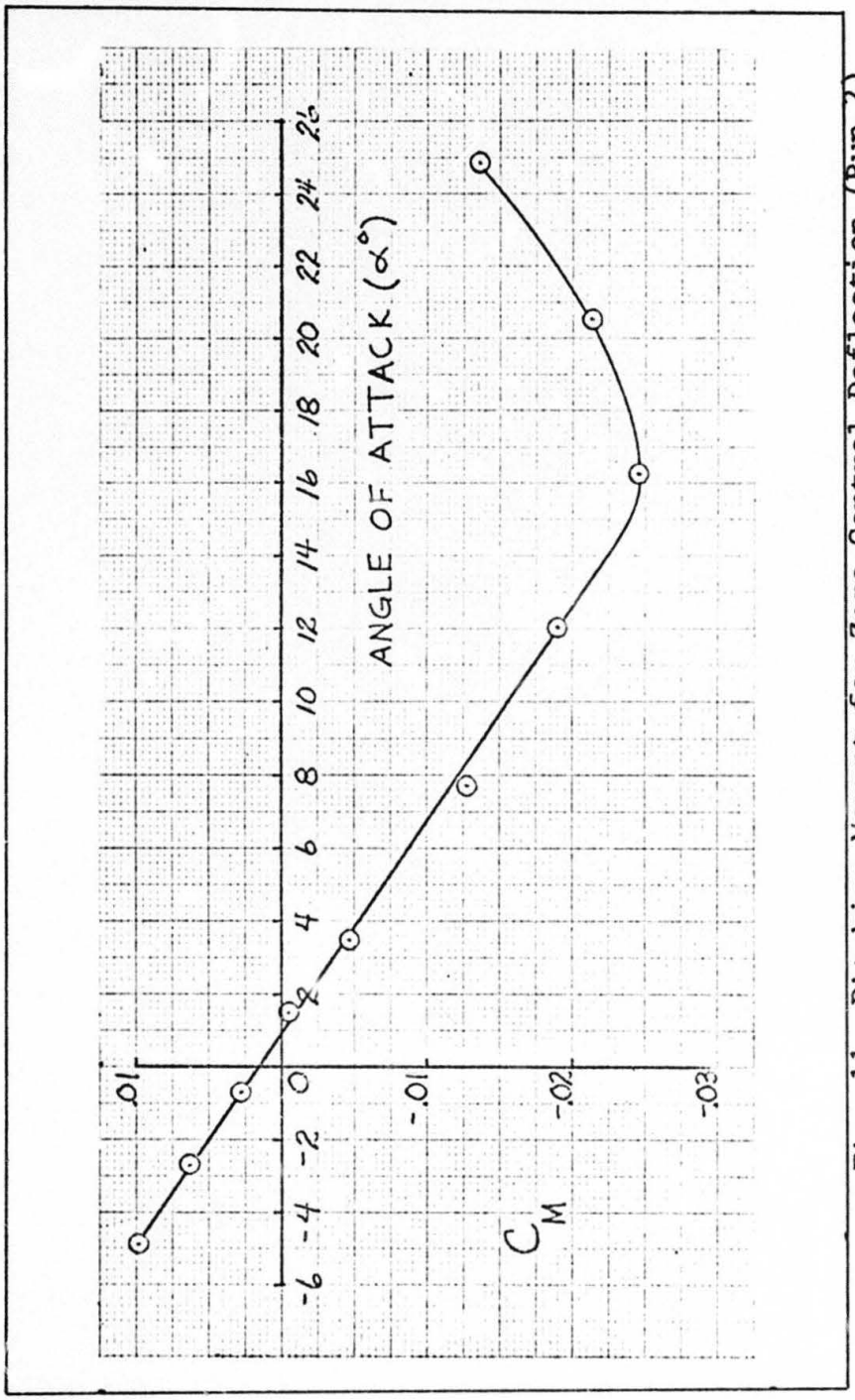

Fig. 11. Pitching Moment for Zero Control Deflection (Run 2).

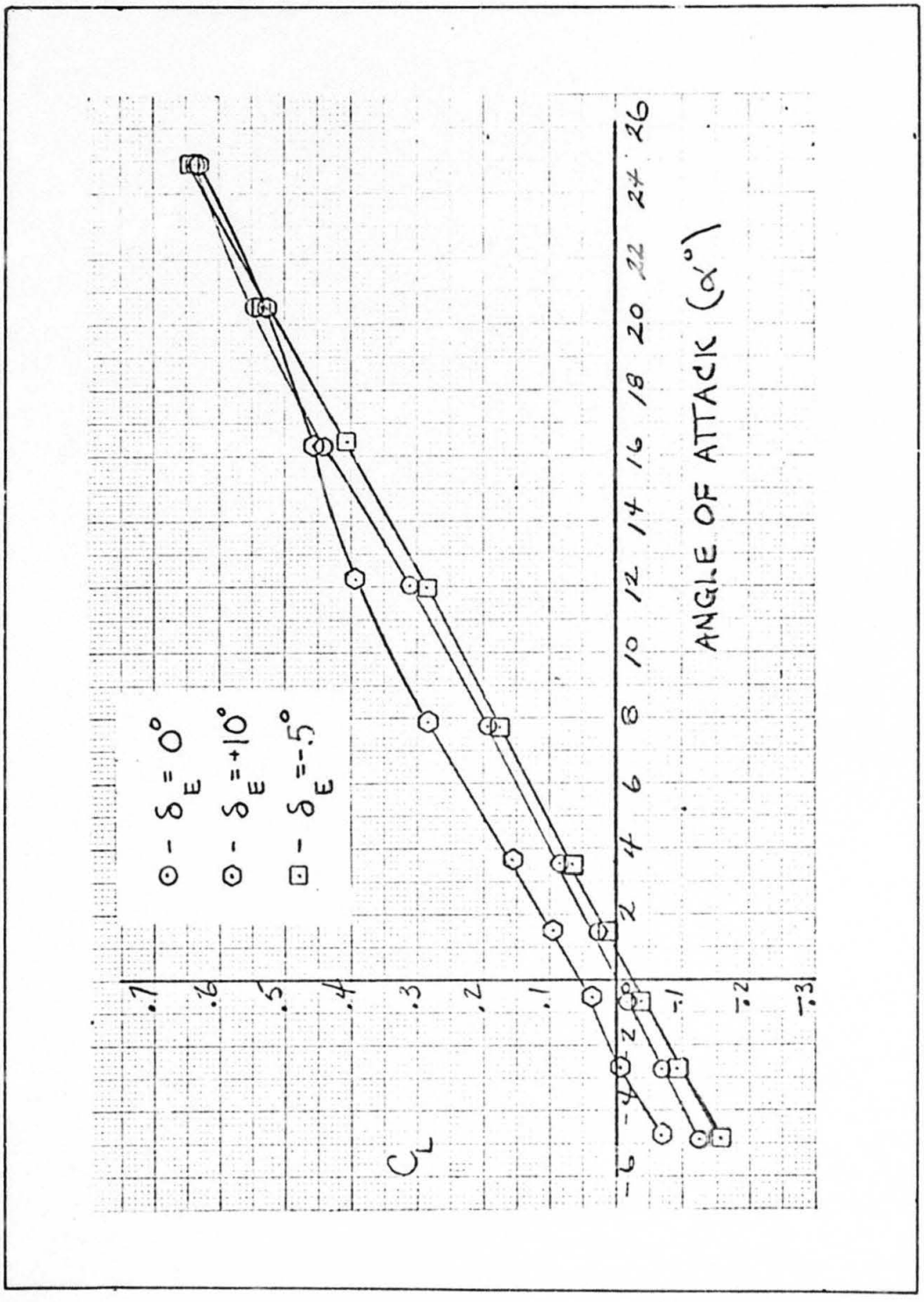

Fig. 12. Change in the Lift Curve with Elevator Deflection

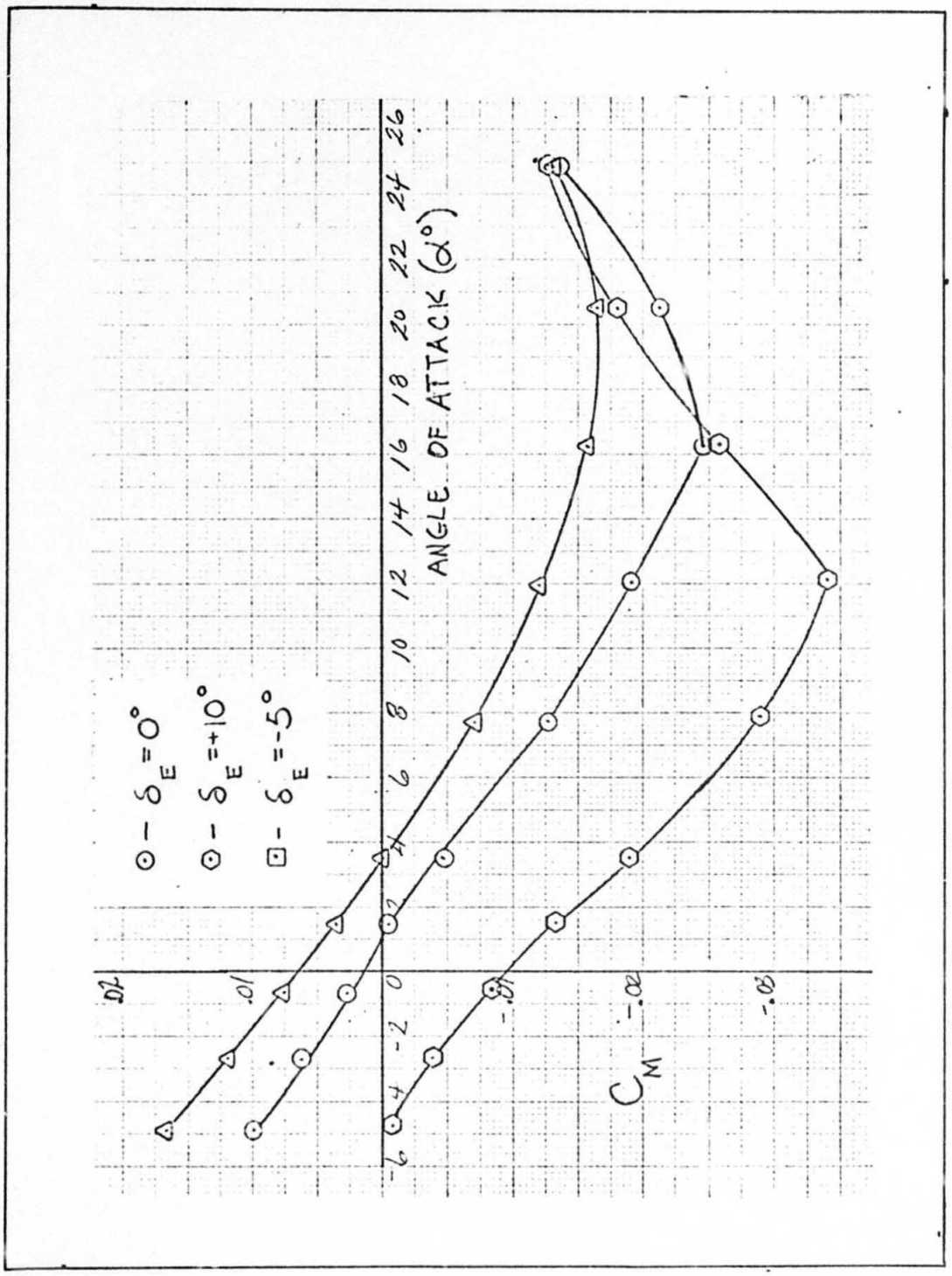

Fig. 13. Change in the pitching moment with Elevator Deflection

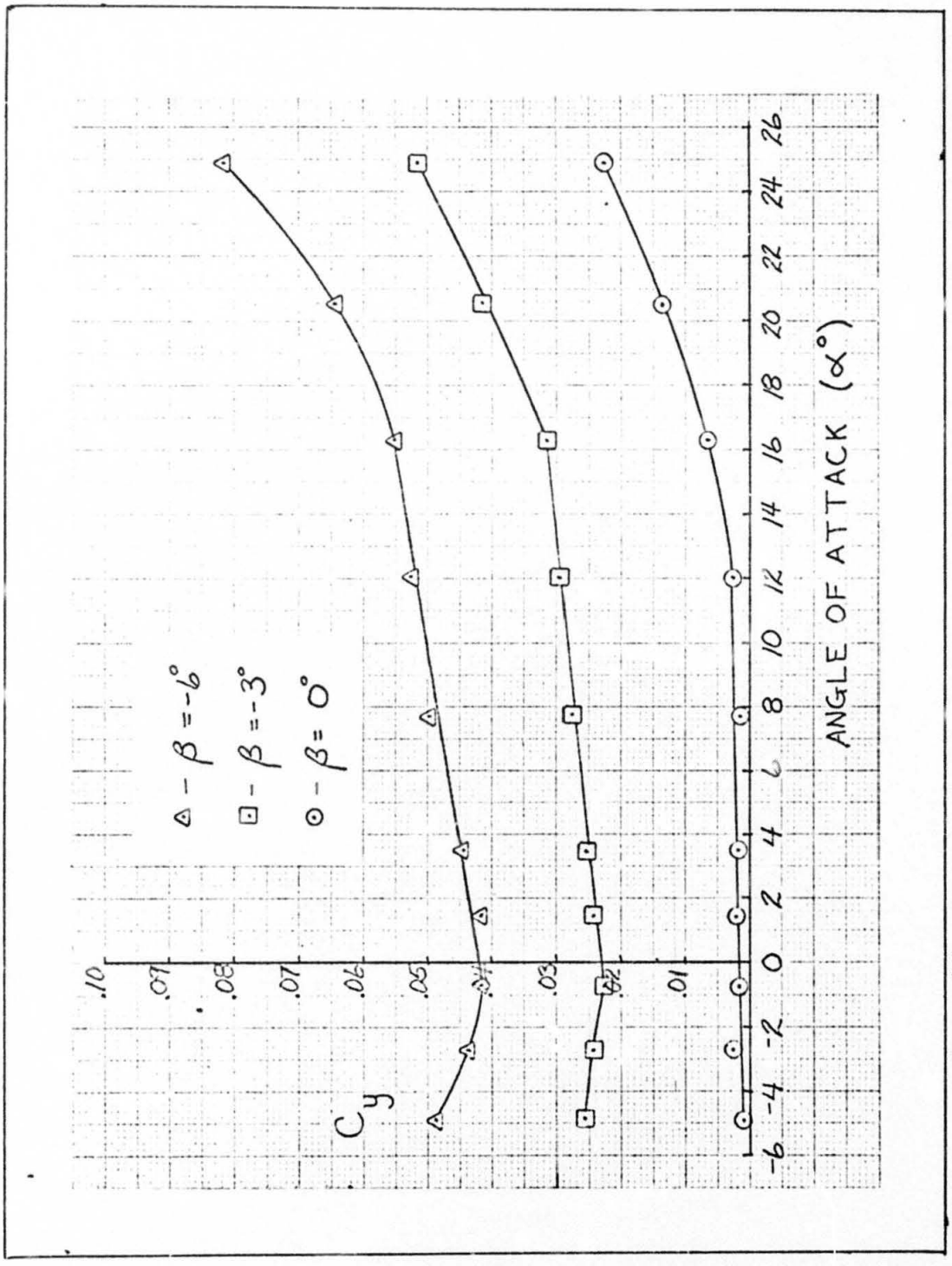

Fig. 14. Change in the Side Force Coefficient with Yaw Angle

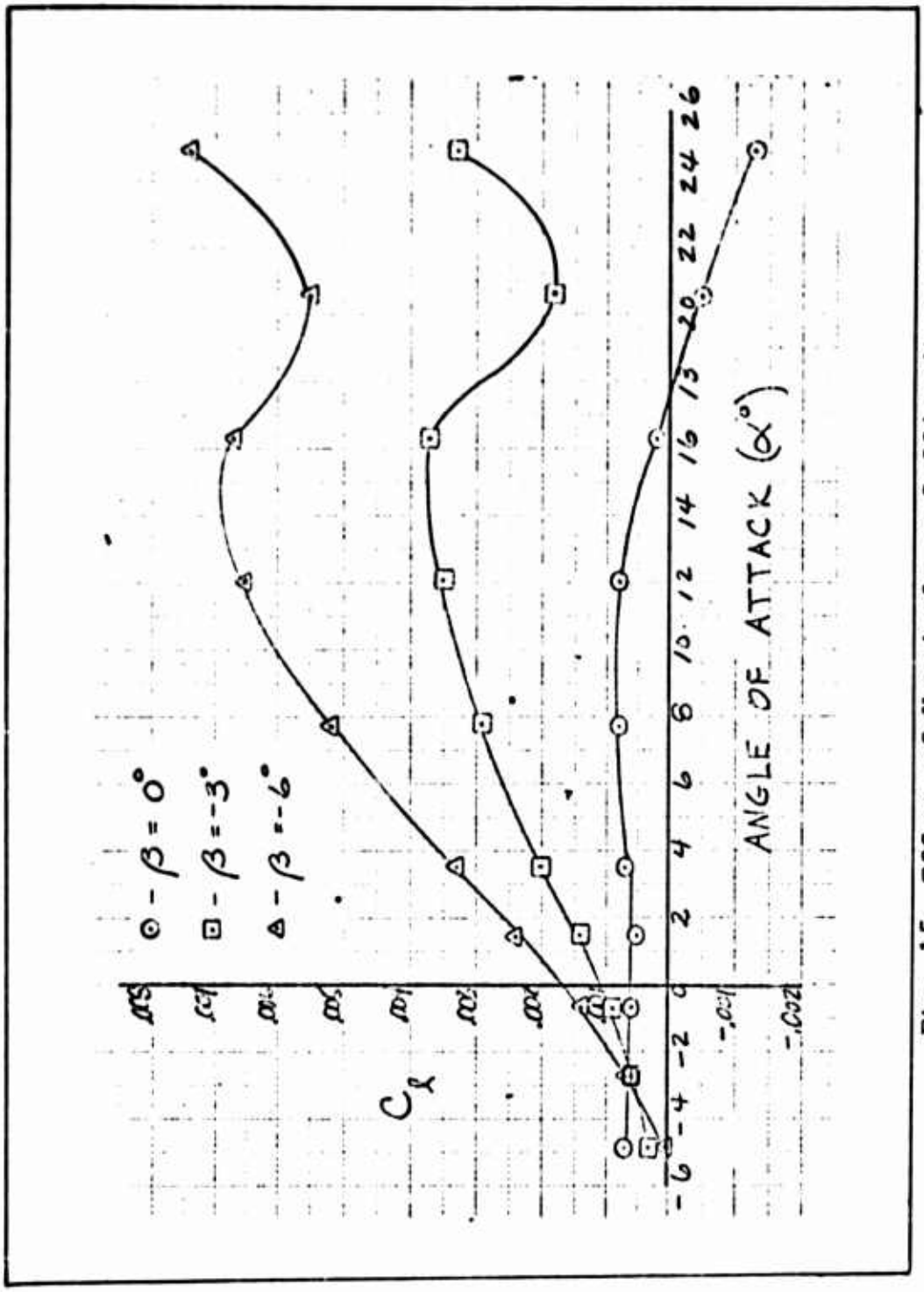

Fig. 15. Effect of Yaw Angle on Rolling Moment

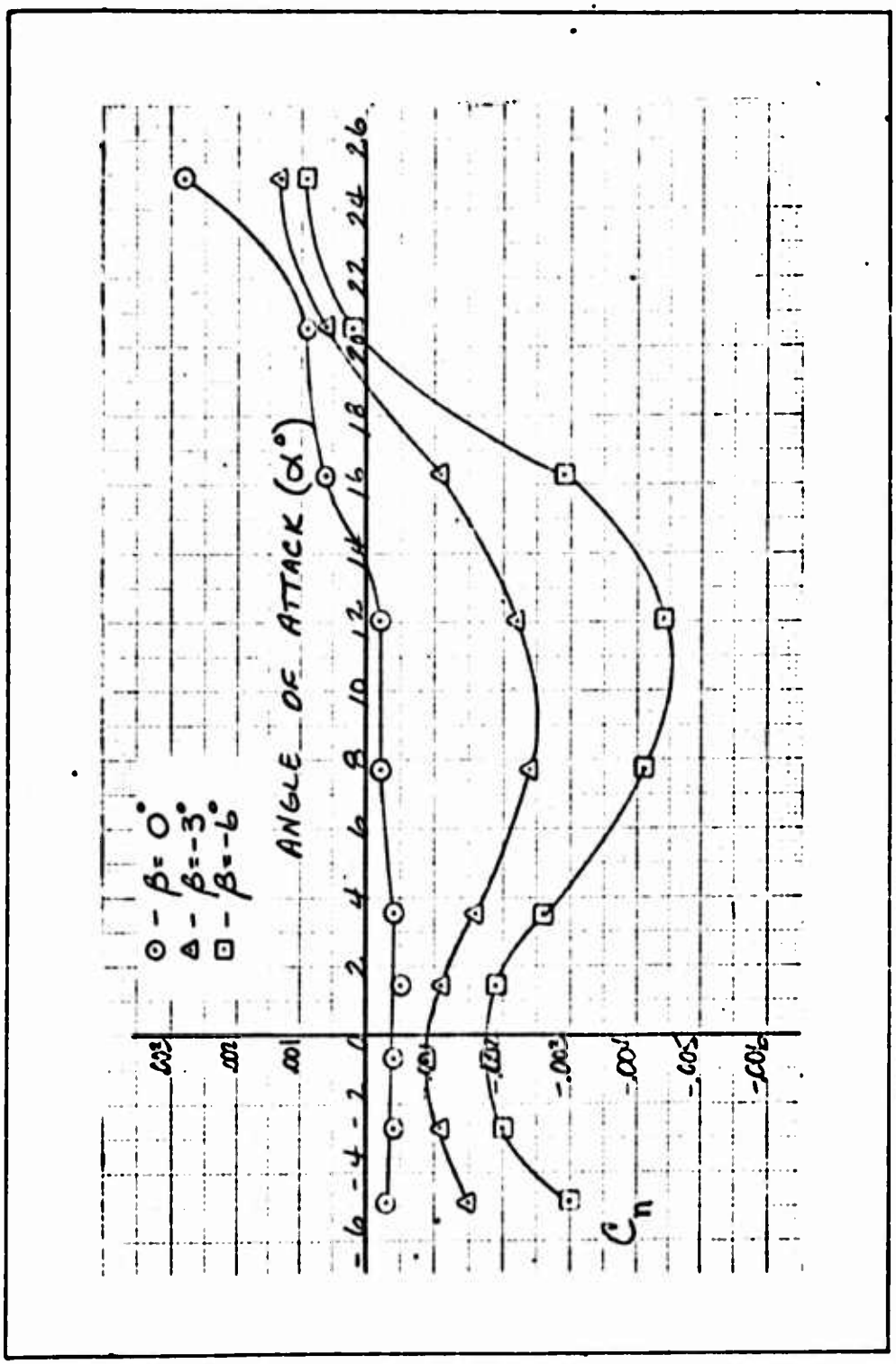

Fig. 16. Effect of Yaw Angle on Yawing Moment

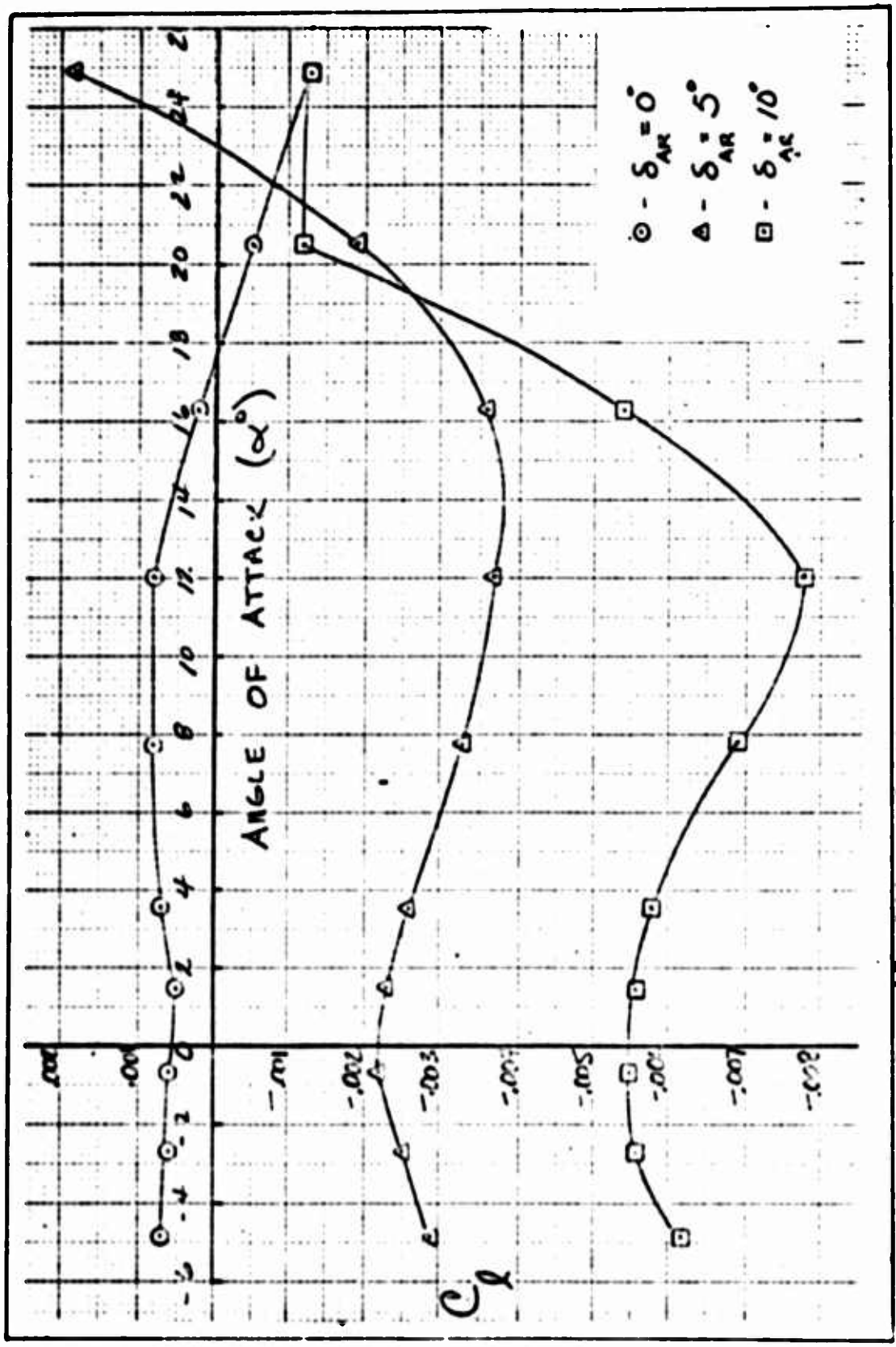

Fig. 17. Effect of Aileron Deflection on Rolling Moment

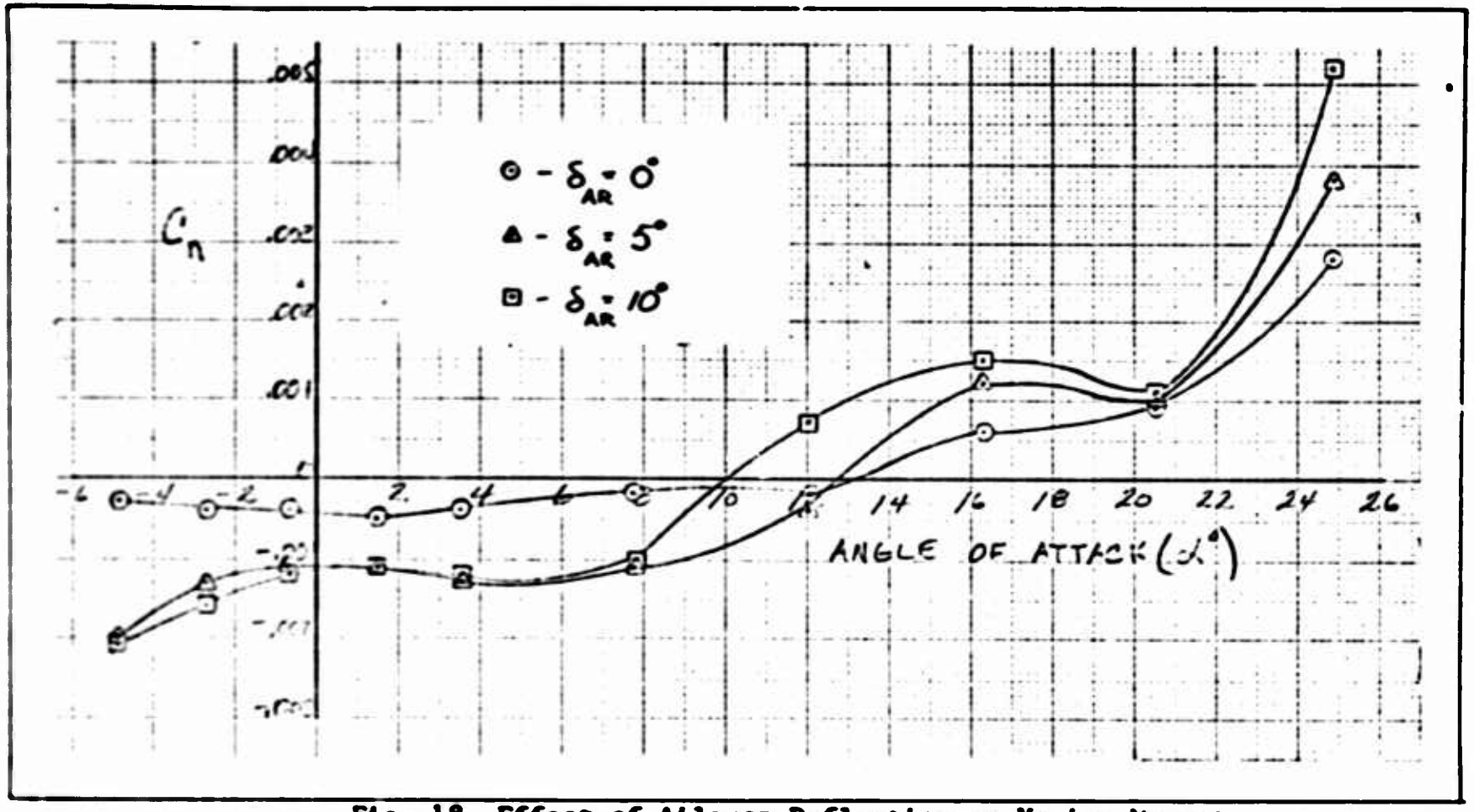

Fig. 18. Effect of Aileron Deflection on Yawing Moment

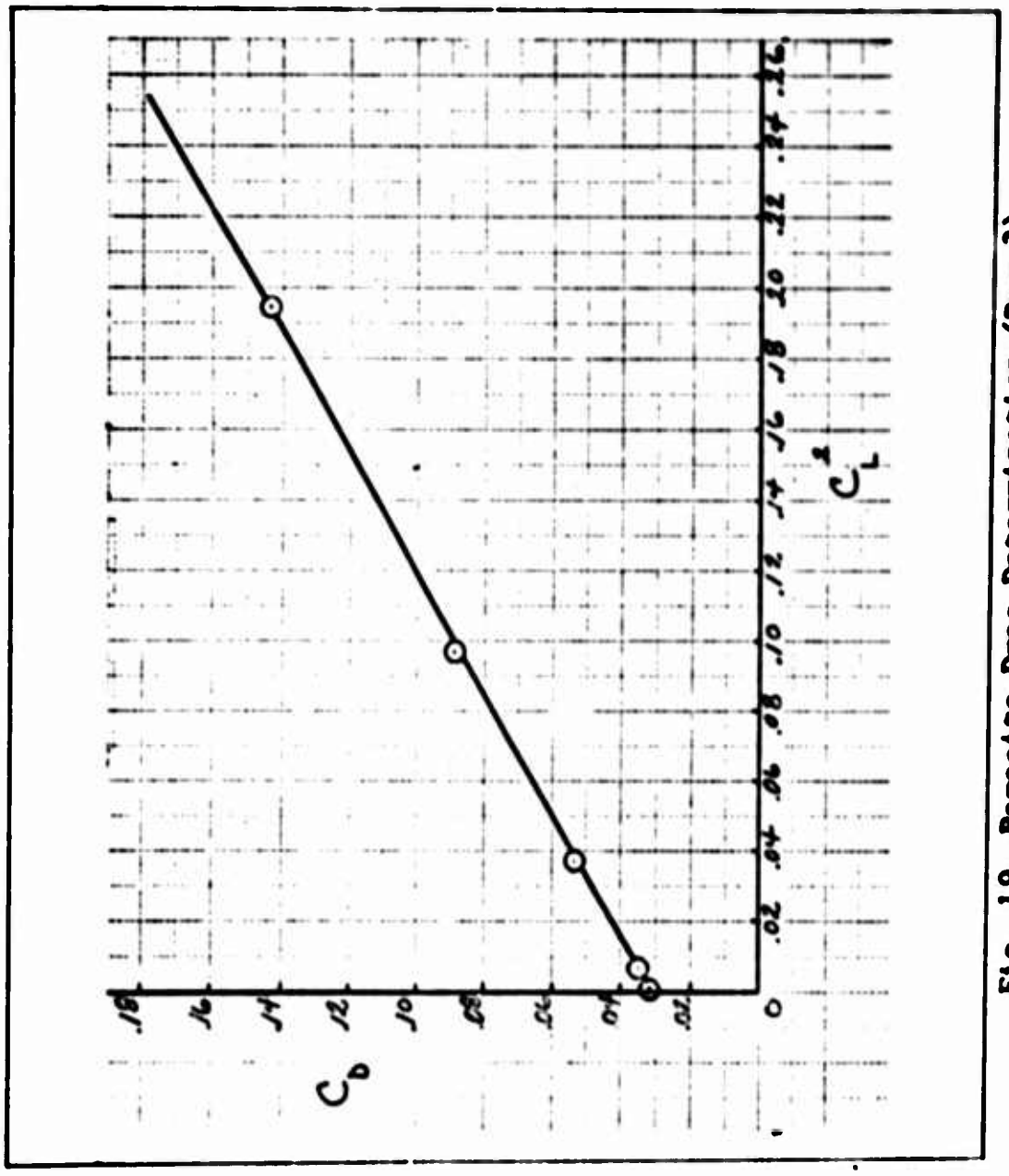

Fig. 19. Parasite Drag Determination (Run 2)

Appendix B

Model Configurations

Table II

RUN	Ψ	δL	δR	q
1	0	0	0	25
2	0	0	0	50
3	0	0	0	75
4	0	0	0	100
5	6	0	0	50
6	3	0	0	50
7	6	10	10	50
8	3	10	10	50
9	0	10	10	50
10	0	-10	-10	50
11	3	-10	-10	50
12	6	-10	-10	50
13	0	-10	10	50
14	3	-10	10	50
15	6	-10	10	50
17	-3	-10	10	50
18	-6	-10	10	50
19	0	-5	-5	50
22	-6	-5	-5	50
23	-6	-5	-5	50
24	6	-5	5	50
25	3	-5	5	50
26	0	-5	5	50
27	-3	-5	5	50
28	-6	-5	5	50

Appendix C

The following pages contain the data used in this project. The configurations for each run can be found in Appendix B. Note that each run is broken into two sections, the first containing the parameters relating to the body axis and the second containing those relating to the wind axis. The following is a list of the terms used in the data sheets.

List of Terms

Body Axis

RUN	Index number for a cycle of tunnel operation.
TPN	Index number for a particular test point.
ALPHA	Angle of attack.
YAW	Euler angle Ψ
C.P.	Center of pressure location in % of reference length.
CN	Normal force coefficient.
CY	Side force coefficient.
CA	Axial force coefficient.
CM	Pitching moment coefficient.
CZ	Yawing moment coefficient.
CX	Rolling moment coefficient.
CBP	Base pressure coefficient.

Wind Axis

FL/FD ..... Lift over drag ratio (L/D).

CL ..... Lift coefficient.

CD ..... Drag coefficient.

BODY AXIS

MACH NUMBER= .13

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
1	15	-.62	0.00	79.95	-.0201	.0056	.0311	.0029	-.0008	.0007	-1.1014
1	16	-.63	0.00	77.65	-.0290	.0056	.0318	.0035	-.0008	.0006	-1.1022
1	17	-4.74	0.00	73.59	-.1282	.0051	.0279	.0103	-.0006	.0007	-1.1022
1	18	-4.76	0.00	73.48	-.1415	.0051	.0281	.0112	-.0006	.0007	-1.1023
1	19	-2.69	0.00	74.33	-.0823	.0012	.0305	.0072	-.0003	.0006	-1.1021
1	20	-2.69	0.00	74.33	-.0822	.0012	.0305	.0072	-.0003	.0007	-1.1021
1	21	-.63	0.00	77.26	-.0310	.0014	.0318	.0036	-.0005	.0006	-1.1016
1	22	-.63	0.00	77.27	-.0310	.0014	.0318	.0036	-.0005	.0006	-1.1018
1	23	1.44	0.00	67.57	.0297	.0021	.0307	-.0046	-.0005	.0007	-1.1010
1	24	1.44	0.00	67.90	.0319	.0021	.0307	-.0007	-.0005	.0007	-1.1011
1	25	3.50	0.00	71.13	.0823	.0028	.0292	-.0046	-.0006	.0007	-1.0998
1	26	3.50	0.00	71.13	.0823	.0028	.0292	-.0046	-.0005	.0007	-1.0998
1	27	7.63	0.00	72.05	.2003	.0004	.0269	-.0130	-.0002	.0007	-1.0983
1	28	7.63	0.00	72.04	.1937	.0005	.0270	-.0125	-.0002	.0006	-1.0985
1	29	11.79	0.00	71.66	.3256	.0009	.0202	-.0198	-.0001	.0007	-1.0961
1	30	11.79	0.00	71.66	.3256	.0009	.0202	-.0198	-.0001	.0007	-1.0959
1	31	15.94	0.00	70.87	.4432	.0044	.0129	-.0235	.0006	.0004	-1.0931
1	32	20.10	0.00	69.31	.5631	.0063	.0075	-.0210	.0014	-.0005	-1.0904
1	33	20.11	0.00	69.32	.5653	.0063	.0075	-.0212	.0014	-.0005	-1.0909
1	34	24.28	0.00	67.74	.6820	.0124	.0024	-.0148	.0015	-.0006	-1.0888
1	35	24.28	0.00	67.73	.6844	.0124	.0024	-.0148	.0015	-.0005	-1.0890
1	36	20.12	0.00	69.67	.5826	.0092	.0067	-.0239	.0012	-.0015	-1.0908
1	37	20.12	0.00	69.66	.5804	.0093	.0067	-.0238	.0012	-.0016	-1.0914
1	38	-.36	0.00	71.83	.2053	.0066	.1256	-.0128	-.0005	.0007	-1.1002
1	39	-.36	0.00	71.82	.2031	.0066	.1257	-.0127	-.0005	.0007	-1.1002
1	40	-.63	0.00	76.42	-.0254	.0056	.0317	.0028	-.0008	.0006	-1.1004

WIND AXIS

MACH NUMBER= .13

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
1	15	-.62	0.00	79.95	-.6326	-.0198	.0056	.0313
1	16	-.63	0.00	77.65	-.8922	-.0286	.0056	.0321
1	17	-4.74	0.00	73.59	-3.2669	-.1254	.0051	.0384
1	18	-4.76	0.00	73.48	-3.4881	-.1386	.0051	.0397
1	19	-2.69	0.00	74.33	-2.3535	-.0807	.0012	.0343
1	20	-2.69	0.00	74.33	-2.3527	-.0807	.0012	.0343
1	21	-.63	0.00	77.26	-.9538	-.0307	.0014	.0322
1	22	-.63	0.00	77.27	-.9536	-.0307	.0014	.0322
1	23	1.44	0.00	67.57	.9209	.0290	.0021	.0315
1	24	1.44	0.00	67.56	.9896	.0311	.0021	.0315
1	25	3.50	0.00	71.13	2.3525	.0804	.0028	.0342
1	26	3.50	0.00	71.13	2.3526	.0804	.0028	.0342
1	27	7.63	0.00	72.05	3.6578	.1949	.0004	.0533
1	28	7.63	0.00	72.04	3.5905	.1884	.0005	.0525
1	29	11.79	0.00	71.66	3.6471	.3146	.0009	.0863
1	30	11.79	0.00	71.66	3.6471	.3146	.0009	.0863
1	31	15.94	0.00	70.87	3.1518	.4226	.0044	.1341
1	32	20.10	0.00	69.31	2.6237	.5252	.0063	.2006
1	33	20.11	0.00	69.32	2.6239	.5283	.0063	.2013
1	34	24.28	0.00	67.74	2.1962	.6207	.0124	.2826
1	35	24.28	0.00	67.73	2.1960	.6229	.0124	.2836
1	36	20.12	0.00	69.67	2.6352	.5447	.0092	.2067
1	37	20.12	0.00	69.66	2.6351	.5427	.0093	.2059
1	38	-.36	0.00	71.83	1.6576	.2061	.0066	.1243
1	39	-.36	0.00	71.82	1.6394	.2039	.0066	.1244
1	40	-.63	0.00	76.42	-.7818	-.0250	.0056	.0320

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
2	42	-.64	0.00	78.30	-.0255	.0005	.0314	.0033	-.0003	.0005	-.5443
2	43	-.64	0.00	77.95	-.0257	.0005	.0314	.0032	-.0003	.0005	-.5448
2	44	-4.83	0.00	73.21	-.1301	.0010	.0285	.0099	-.0003	.0007	-.5452
2	45	-4.83	0.00	73.15	-.1291	.0019	.0285	.0098	-.0004	.0008	-.5458
2	46	-2.72	0.00	74.20	-.0715	.0024	.0303	.0062	-.0004	.0006	-.5453
2	47	-2.73	0.00	74.08	-.0716	.0013	.0303	.0061	-.0003	.0006	-.5454
2	48	-.63	0.00	79.40	-.0192	.0015	.0310	.0026	-.0004	.0006	-.5449
2	49	-.63	0.00	79.41	-.0192	.0015	.0313	.0027	-.0004	.0005	-.5451
2	50	1.45	0.00	67.41	.0265	.0021	.0312	-.0005	-.0005	.0005	-.5447
2	51	1.45	0.00	67.42	.0265	.0021	.0312	-.0005	-.0004	.0005	-.5447
2	52	3.56	0.00	71.15	.0833	.0016	.0296	-.0046	-.0004	.0007	-.5441
2	53	3.56	0.00	71.15	.0833	.0017	.0296	-.0046	-.0004	.0006	-.5443
2	54	7.77	0.00	71.96	.1988	.0012	.0271	-.0127	-.0002	.0008	-.5433
2	55	7.77	0.00	72.03	.2009	.0012	.0271	-.0129	-.0002	.0007	-.5435
2	56	12.01	0.00	71.49	.3225	.0026	.0219	-.0191	-.0002	.0008	-.5422
2	57	12.01	0.00	71.52	.3235	.0037	.0219	-.0192	-.0002	.0008	-.5423
2	58	16.29	0.00	70.87	.4634	.0065	.0143	-.0246	.0006	.0002	-.5412
2	59	16.29	0.00	70.87	.4634	.0076	.0143	-.0246	.0004	.0001	-.5412
2	60	20.57	0.00	69.22	.5838	.0134	.0071	-.0213	.0009	-.0005	-.5401
2	61	20.58	0.00	69.22	.5861	.0135	.0070	-.0214	.0009	-.0005	-.5403
2	62	24.87	0.00	67.50	.7025	.0229	.0025	-.0136	.0028	-.0013	-.5405
2	63	24.85	0.00	67.53	.7010	.0237	.0025	-.0137	.0027	-.0012	-.5408
2	64	21.58	0.00	69.23	.5872	.0105	.0068	-.0215	.0014	-.0006	-.5418
2	65	20.58	0.00	69.22	.5884	.0105	.0070	-.0215	.0013	-.0005	-.5420
2	66	7.78	0.00	71.97	.2074	.0046	.0273	-.0133	-.0005	.0007	-.5449
2	67	7.79	0.00	71.97	.2085	.0045	.0273	-.0133	-.0005	.0007	-.5451
2	68	-.63	0.00	78.69	-.0216	.0067	.0313	.0028	-.0008	.0006	-.5465

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/ED	CL	CC	CD
2	42	-.64	0.00	78.30	-.7951	-.0252	.0005	.0317
2	43	-.64	0.00	77.95	-.7991	-.0253	.0005	.0317
2	44	-4.83	0.00	73.21	-3.2283	-.1272	.0019	.0394
2	45	-4.83	0.00	73.15	-3.2122	-.1262	.0019	.0393
2	46	-2.72	0.00	74.20	-2.0791	-.0700	.0024	.0337
2	47	-2.73	0.00	74.08	-2.0812	-.0701	.0013	.0337
2	48	-.63	0.00	79.40	-.6025	-.0188	.0015	.0312
2	49	-.63	0.00	79.41	-.5977	-.0188	.0015	.0315
2	50	1.45	0.00	67.41	.8060	.0257	.0021	.0319
2	51	1.45	0.00	67.42	.8063	.0257	.0021	.0319
2	52	3.56	0.00	71.15	2.3457	.0813	.0016	.0347
2	53	3.56	0.00	71.15	2.3455	.0813	.0017	.0347
2	54	7.77	0.00	71.96	3.5997	.1934	.0012	.0537
2	55	7.77	0.00	72.00	3.6197	.1954	.0012	.0540
2	56	12.01	0.00	71.49	3.5107	.3110	.0026	.0886
2	57	12.01	0.00	71.52	3.5134	.3119	.0037	.0888
2	58	16.29	0.00	70.87	3.0679	.4408	.0065	.1437
2	59	16.29	0.00	70.87	3.0680	.4408	.0076	.1437
2	60	20.57	0.00	69.22	2.5698	.5441	.0134	.2117
2	61	20.58	0.00	69.22	2.5696	.5452	.0135	.2126
2	62	24.87	0.00	67.50	2.1376	.6363	.0229	.2977
2	63	24.86	0.00	67.53	2.1379	.6350	.0237	.2970
2	64	20.58	0.00	69.23	2.5732	.5474	.0105	.2127
2	65	20.58	0.00	69.22	2.5695	.5484	.0105	.2134
2	66	7.78	0.00	71.97	3.6612	.2018	.0045	.0551
2	67	7.79	0.00	71.97	3.6712	.2029	.0045	.0553
2	68	-.63	0.00	78.69	-.6727	-.0212	.0067	.0316

BODY AXIS

MACH NUMBER= .23

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
3	70	-.67	0.00	77.70	-.0293	-.0014	.0319	.0036	-.0004	.0005	-.3634
3	71	-.66	0.00	77.84	-.0286	-.0013	.0319	.0035	-.0004	.0005	-.3636
3	72	-4.94	0.00	73.17	-.1378	-.0011	.0295	.0105	-.0002	.0007	-.3641
3	73	-4.93	0.00	73.22	-.1377	-.0011	.0296	.0105	-.0002	.0007	-.3643
3	74	-2.79	0.00	74.20	-.0777	-.0008	.0308	.0067	-.0003	.0006	-.3638
3	75	-.65	0.00	78.34	-.0244	-.0013	.0318	.0031	-.0003	.0005	-.3638
3	76	-.65	0.00	78.52	-.0236	-.0013	.0318	.0031	-.0003	.0005	-.3640
3	77	1.47	0.00	67.43	.0265	-.0029	.0313	-.0005	-.0002	.0005	-.3637
3	78	1.47	0.00	67.43	.0265	-.0029	.0313	-.0005	-.0002	.0006	-.3639
3	79	3.61	0.00	70.85	.0812	-.0016	.0305	-.0043	-.0003	.0007	-.3635
3	80	3.61	0.00	71.16	.0810	-.0016	.0305	-.0044	-.0003	.0006	-.3636
3	81	7.91	0.00	71.94	.2029	-.0026	.0279	-.0129	-.0001	.0006	-.3630
3	82	7.92	0.00	71.94	.2044	-.0026	.0278	-.0130	-.0000	.0007	-.3630
3	83	12.26	0.00	71.45	.3313	-.0014	.0225	-.0195	.0001	.0006	-.3620
3	84	12.26	0.00	71.45	.3313	-.0014	.0225	-.0195	.0001	.0006	-.3621
3	85	16.65	0.00	70.73	.4721	.0014	.0142	-.0244	.0010	-.0000	-.3614
3	86	16.65	0.00	70.74	.4742	.0014	.0142	-.0245	.0010	.0000	-.3615
3	87	21.06	0.00	69.04	.5998	.0049	.0075	-.0208	.0018	-.0008	-.3610
3	88	21.06	0.00	69.03	.5992	.0056	.0073	-.0207	.0017	-.0007	-.3613
3	89	25.48	0.00	67.26	.7173	.0182	.0027	-.0121	.0040	-.0016	-.3626
3	90	25.48	0.00	67.26	.7189	.0175	.0027	-.0121	.0040	-.0016	-.3629
3	91	21.06	0.00	68.99	.5972	.0056	.0073	-.0204	.0017	-.0007	-.3632
3	92	21.06	0.00	69.01	.5986	.0056	.0073	-.0206	.0017	-.0007	-.3634
3	93	7.92	0.00	71.97	.2049	-.0018	.0280	-.0131	-.0001	.0006	-.3643
3	94	7.92	0.00	71.97	.2049	-.0018	.0278	-.0131	-.0001	.0006	-.3644

WIND AXIS

MACH NUMBER= .23

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
3	70	-.67	0.00	77.70	-.8982	-.0289	-.0014	.0322
3	71	-.66	0.00	77.84	-.8760	-.0282	-.0013	.0322
3	72	-4.94	0.00	73.17	-3.2562	-.1347	-.0011	.0414
3	73	-4.93	0.00	73.22	-3.2546	-.1346	-.0011	.0414
3	74	-2.79	0.00	74.20	-2.2857	-.0761	-.0008	.0345
3	75	-.65	0.00	78.34	-.7475	-.0240	-.0013	.0321
3	76	-.65	0.00	78.52	-.7250	-.0233	-.0013	.0321
3	77	1.47	0.00	67.43	.8025	.0257	-.0029	.0320
3	78	1.47	0.00	67.43	.8027	.0257	-.0029	.0320
3	79	3.61	0.00	70.85	2.2285	.0792	-.0016	.0355
3	80	3.61	0.00	71.06	2.2232	.0789	-.0016	.0355
3	81	7.91	0.00	71.94	3.5499	.1971	-.0026	.0555
3	82	7.92	0.00	71.94	3.5630	.1986	-.0026	.0557
3	83	12.26	0.00	71.45	3.4569	.3189	-.0014	.0923
3	84	12.26	0.00	71.45	3.4569	.3189	-.0014	.0923
3	85	16.65	0.00	70.73	3.0118	.4482	.0014	.1488
3	86	16.65	0.00	70.74	3.0124	.4503	.0014	.1495
3	87	21.06	0.00	69.04	2.5034	.5571	.0049	.2225
3	88	21.06	0.00	69.03	2.5057	.5565	.0056	.2221
3	89	25.48	0.00	67.26	2.0780	.6464	.0182	.3111
3	90	25.48	0.00	67.26	2.0776	.6478	.0175	.3118
3	91	21.06	0.00	68.99	2.5057	.5547	.0056	.2214
3	92	21.06	0.00	69.01	2.5056	.5560	.0056	.2219
3	93	7.92	0.00	71.97	3.5563	.1991	-.0018	.0560
3	94	7.92	0.00	71.97	3.5687	.1992	-.0018	.0558

BODY AXIS

MACH NUMBER= .27

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
4	97	-.68	0.00	77.94	-.0273	.0004	.0317	.0034	-.0005	.0005	-.2753
4	98	-.68	0.00	78.10	-.0273	.0005	.0317	.0034	-.0005	.0005	-.2756
4	99	-5.04	0.00	73.28	-.1430	.0020	.0292	.0110	-.0005	.0007	-.2754
4	100	-5.03	0.00	73.22	-.1419	.0010	.0292	.0109	-.0004	.0007	-.2756
4	101	-2.84	0.00	74.51	-.0798	.0012	.0307	.0071	-.0005	.0007	-.2756
4	102	-2.84	0.00	74.32	-.0789	.0007	.0307	.0069	-.0005	.0006	-.2757
4	105	-.66	0.00	79.45	-.0228	.0015	.0318	.0032	-.0005	.0006	-.2760
4	106	-.66	0.00	79.04	-.0229	.0019	.0318	.0031	-.0006	.0006	-.2760
4	107	1.49	0.00	66.46	.0262	.0015	.0313	-.0002	-.0006	.0006	-.2762
4	108	1.49	0.00	66.46	.0262	.0015	.0313	-.0002	-.0006	.0006	-.2753
4	109	3.67	0.00	70.75	.0836	.0012	.0312	-.0043	-.0005	.0007	-.2764
4	110	3.67	0.00	70.84	.0834	.0010	.0302	-.0044	-.0005	.0007	-.2764
4	111	8.07	0.00	71.85	.2103	.0018	.0275	-.0132	-.0004	.0007	-.2757
4	112	8.07	0.00	71.83	.2103	.0012	.0275	-.0132	-.0003	.0007	-.2758
4	113	12.52	0.00	71.35	.3435	.0018	.0221	-.0199	-.0001	.0007	-.2742
4	114	12.52	0.00	71.35	.3441	.0019	.0221	-.0199	-.0001	.0007	-.2742
4	115	17.04	0.00	70.68	.4897	.0056	.0138	-.0250	.0007	.0008	-.2744
4	116	17.04	0.00	70.68	.4909	.0051	.0138	-.0251	.0008	-.0000	-.2745
4	117	21.58	0.00	68.89	.6203	.0090	.0069	-.0206	.0019	-.0011	-.2759
4	118	21.58	0.00	68.91	.6218	.0089	.0068	-.0208	.0019	-.0010	.0017
4	119	26.16	0.00	66.97	.7466	.0243	.0022	-.0104	.0047	-.0015	-.0011
4	120	26.16	0.00	66.94	.7451	.0249	.0023	-.0102	.0046	-.0014	-.0011
4	121	21.59	0.00	68.85	.6218	.0085	.0065	-.0204	.0019	-.0010	.0007
4	122	21.58	0.00	68.88	.6221	.0081	.0065	-.0206	.0019	-.0011	.0007
4	123	8.08	0.00	71.86	.2125	.0008	.0279	-.0134	-.0003	.0007	-.2757
4	124	8.08	0.00	71.84	.2120	.0003	.0278	-.0133	-.0002	.0007	-.2757

WIND AXIS

MACH NUMBER= .27

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
4	97	-.68	0.00	77.94	-.8428	-.0270	.0004	.0320
4	98	-.68	0.00	78.10	-.8420	-.0269	.0005	.0320
4	99	-5.04	0.00	73.28	-3.3607	-.1398	.0020	.0416
4	100	-5.03	0.00	73.22	-3.3452	-.1388	.0010	.0415
4	101	-2.84	0.00	74.51	-2.2567	-.0782	.0012	.0346
4	102	-2.84	0.00	74.32	-2.2357	-.0773	.0007	.0346
4	105	-.66	0.00	79.45	-.7008	-.0225	.0015	.0320
4	106	-.66	0.00	79.04	-.7043	-.0225	.0019	.0320
4	107	1.49	0.00	66.46	.7941	.0254	.0015	.0320
4	108	1.49	0.00	66.46	.7941	.0254	.0015	.0320
4	109	3.67	0.00	70.75	2.2951	.0814	.0010	.0355
4	110	3.67	0.00	70.84	2.2924	.0813	.0010	.0355
4	111	8.07	0.00	71.85	3.5999	.2043	.0018	.0568
4	112	8.07	0.00	71.83	3.6012	.2044	.0012	.0568
4	113	12.52	0.00	71.35	3.4428	.3306	.0018	.0960
4	114	12.52	0.00	71.35	3.4439	.3311	.0019	.0961
4	115	17.04	0.00	70.68	2.9625	.4642	.0056	.1567
4	116	17.04	0.00	70.68	2.9626	.4653	.0051	.1571
4	117	21.58	0.00	68.89	2.4480	.5743	.0090	.2346
4	118	21.58	0.00	68.91	2.4493	.5757	.0089	.2351
4	119	26.16	0.00	66.97	2.0212	.6591	.0243	.3311
4	120	26.16	0.00	66.94	2.0205	.6678	.0249	.3335
4	121	21.59	0.00	68.85	2.4521	.5758	.0085	.2348
4	122	21.58	0.00	68.88	2.4524	.5761	.0080	.2349
4	123	8.08	0.00	71.86	3.5905	.2065	.0008	.0575
4	124	8.08	0.00	71.84	3.5954	.2160	.0003	.0573

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
5	160	-.63	6.00	75.52	-.0162	.0423	.0314	.0016	-.0019	.0015	0.0000
5	161	-.63	6.00	74.98	-.0163	.0423	.0314	.0015	-.0019	.0015	0.0000
5	162	-4.83	6.00	72.85	-.1313	.0488	.0286	.0096	-.0030	-.0000	-.5461
5	163	-4.83	6.00	72.79	-.1292	.0488	.0286	.0093	-.0030	-.0000	-.5473
5	164	-2.73	6.00	73.45	-.0727	.0431	.0299	.0057	-.0020	.0007	.0044
5	165	-2.73	6.00	73.35	-.0717	.0431	.0299	.0056	-.0020	.0008	.0045
5	166	-.63	6.00	75.56	-.0183	.0413	.0306	.0018	-.0018	.0014	.0046
5	167	-.63	6.00	75.56	-.0183	.0413	.0306	.0018	-.0018	.0014	.0023
5	168	1.46	6.00	70.94	.0332	.0417	.0310	-.0018	-.0019	.0024	0.0000
5	169	1.46	6.00	70.98	.0343	.0418	.0310	-.0019	-.0019	.0023	.0055
5	170	3.56	6.00	72.06	.0883	.0444	.0295	-.0057	-.0026	.0033	-.5419
5	171	3.56	6.00	72.16	.0892	.0445	.0295	-.0059	-.0026	.0032	-.5426
5	173	7.78	6.00	72.18	.2085	.0498	.0262	-.0138	-.0041	.0052	0.0000
5	174	12.03	6.00	71.49	.3334	.0526	.0205	-.0197	-.0044	.0065	.0054
5	175	12.03	6.00	71.49	.3345	.0525	.0208	-.0198	-.0044	.0065	.0029
5	176	16.30	6.00	70.46	.4626	.0552	.0148	-.0226	-.0029	.0067	-.5241
5	177	16.31	6.00	70.46	.4647	.0563	.0148	-.0227	-.0030	.0067	-.5288
5	178	20.58	6.00	69.35	.5905	.0646	.0076	-.0223	.0002	.0055	-.5211
5	179	20.58	6.00	69.35	.5905	.0646	.0074	-.0223	.0002	.0055	-.5221
5	180	24.89	6.00	67.56	.7151	.0814	.0052	-.0142	.0009	.0074	.0028
5	181	24.91	6.00	67.62	.7241	.0814	.0049	-.0148	.0011	.0074	.0027
5	182	20.59	6.00	69.32	.5928	.0669	.0074	-.0222	.0002	.0054	.0025
5	183	20.59	6.00	69.32	.5929	.0658	.0076	-.0222	.0002	.0055	.0027
5	184	7.80	6.00	72.26	.2146	.0519	.0264	-.0143	-.0042	.0052	-.5439
5	185	7.79	6.00	72.22	.2126	.0519	.0261	-.0141	-.0042	.0052	-.5440
5	186	-.63	6.00	76.11	-.0183	.0464	.0309	.0019	-.0022	.0015	-.5488

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
5	160	-.63	6.00	75.52	-.4419	-.0158	.0387	.0358
5	161	-.63	6.00	74.98	-.4457	-.0160	.0387	.0359
5	162	-4.83	6.00	72.85	-2.8872	-.1284	.0444	.0445
5	163	-4.83	6.00	72.79	-2.8543	-.1269	.0444	.0443
5	164	-2.73	6.00	73.45	-1.8923	-.0712	.0393	.0376
5	165	-2.73	6.00	73.35	-1.8598	-.0702	.0413	.0378
5	166	-.63	6.00	75.56	-.5132	-.0179	.0378	.0349
5	167	-.63	6.00	75.56	-.5132	-.0179	.0378	.0349
5	168	1.46	6.00	70.94	.8979	.0324	.0382	.0361
5	169	1.46	6.00	70.98	.9268	.0335	.0383	.0361
5	170	3.56	6.00	72.06	2.1919	.0863	.0405	.0394
5	171	3.56	6.00	72.16	2.2124	.0872	.0406	.0394
5	173	7.78	6.00	72.18	3.4368	.2030	.0438	.0591
5	174	12.03	6.00	71.49	3.4033	.3219	.0430	.0946
5	175	12.03	6.00	71.49	3.3958	.3229	.0429	.0951
5	176	16.30	6.00	70.46	2.9524	.4398	.0399	.1490
5	177	16.30	6.00	70.46	2.9517	.4419	.0408	.1497
5	178	20.58	6.00	69.35	2.4971	.5501	.0418	.2203
5	179	20.58	6.00	69.35	2.5006	.5502	.0418	.2200
5	180	24.89	6.00	67.56	2.0688	.6474	.0490	.3130
5	181	24.90	6.00	67.62	2.0716	.6512	.0478	.3143
5	182	20.59	6.00	69.32	2.4978	.5524	.0440	.2212
5	183	20.59	6.00	69.32	2.4957	.5524	.0429	.2213
5	184	7.80	6.00	72.26	3.4613	.2090	.0459	.0604
5	185	7.79	6.00	72.22	3.4603	.2171	.0459	.0598
5	186	-.63	6.00	76.11	-.5032	-.0180	.0429	.0358

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
6	204	-.63	3.00	79.26	-.0175	.0221	.0322	.0024	-.0009	.0010	-.0115
6	206	-4.83	3.00	73.11	-.1297	.0256	.0295	.0098	-.0015	.0003	-.0103
6	208	-2.72	3.00	74.23	-.0719	.0245	.0311	.0062	-.0011	.0006	.5341
6	210	-.63	3.00	78.47	-.0197	.0221	.0320	.0025	-.0009	.0009	.5338
6	212	1.47	3.00	69.26	.0348	.0242	.0325	-.0013	-.0011	.0014	.5334
6	214	3.57	3.00	71.52	.0918	.0252	.0307	-.0054	-.0016	.0020	-.0123
6	216	7.79	3.00	72.07	.2092	.0276	.0281	-.0136	-.0024	.0029	.2400
6	218	12.04	3.00	71.56	.3386	.0295	.0235	-.0203	-.0022	.0035	.2195
6	220	16.32	3.00	70.83	.4760	.0317	.0153	-.0260	-.0011	.0037	.2392
6	222	20.60	3.00	69.56	.6209	.0418	.0084	-.0240	.0006	.0018	.2389
6	224	24.88	3.00	67.65	.7144	.0517	.0047	-.0149	.0013	.0033	-.0126
6	226	29.60	3.00	69.51	.6002	.0408	.0081	-.0237	.0007	.0018	.2385
6	228	7.80	3.00	72.12	.2156	.0276	.0284	-.0141	-.0024	.0030	.2403

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
6	204	-.63	3.00	79.26	-.5099	-.0171	.0204	.0335
6	206	-4.83	3.00	73.11	-3.0473	-.1268	.0234	.0416
6	208	-2.72	3.00	74.23	-1.9681	-.0704	.0226	.0358
6	210	-.63	3.00	78.47	-.5803	-.0193	.0204	.0333
6	212	1.47	3.00	69.26	.9821	.0339	.0224	.0346
6	214	3.57	3.00	71.52	2.3630	.0887	.0233	.0375
6	216	7.79	3.00	72.07	3.5334	.2134	.0246	.0576
6	218	12.04	3.00	71.56	3.4332	.3262	.0245	.0950
6	220	16.32	3.00	70.83	3.0191	.4525	.0239	.1499
6	222	20.60	3.00	69.56	2.5310	.5596	.0303	.2211
6	224	24.88	3.00	67.65	2.1036	.6461	.0357	.3071
6	226	20.60	3.00	69.51	2.5349	.5590	.0293	.2205
6	228	7.80	3.00	72.12	3.5726	.2097	.0246	.0587

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
7	242	-.57	6.00	92.54	.0319	.0419	.0359	-.0086	-.0025	.0014	.5459
7	243	-.57	6.00	91.54	.0347	.0409	.0359	-.0088	-.0024	.0014	.5497
7	244	-4.76	6.00	64.26	-.0760	.0474	.0314	-.0010	-.0036	-.0002	.5482
7	245	-4.76	6.00	64.26	-.0760	.0483	.0314	-.0010	-.0037	-.0002	.5523
7	246	-2.66	6.00	47.02	-.0227	.0437	.0336	-.0042	-.0028	.0006	-.0024
7	247	-2.66	6.00	45.73	-.0216	.0437	.0339	-.0043	-.0028	.0006	-.0025
7	248	-.56	6.00	90.37	.0362	.0419	.0361	-.0090	-.0025	.0014	.5459
7	249	-.56	6.00	90.94	.0351	.0419	.0362	-.0089	-.0025	.0014	.5459
7	250	1.54	6.00	80.46	.0930	.0402	.0381	-.0138	-.0024	.0021	.5464
7	251	1.54	6.00	80.46	.0939	.0412	.0381	-.0140	-.0025	.0022	.5455
7	252	3.65	6.00	77.92	.1552	.0429	.0395	-.0192	-.0030	.0030	.5451
7	253	3.65	6.00	77.92	.1552	.0428	.0395	-.0192	-.0030	.0030	.5499
7	254	7.87	6.00	75.61	.2806	.0453	.0412	-.0282	-.0037	.0047	.5442
7	255	7.88	6.00	75.60	.2817	.0454	.0412	-.0282	-.0037	.0047	.5442
7	256	12.11	6.00	73.58	.3971	.0516	.0413	-.0318	-.0043	.0049	.5433
7	257	12.11	6.00	73.60	.3969	.0516	.0400	-.0319	-.0043	.0049	.5433
7	258	16.32	6.00	71.76	.4756	.0484	.0358	-.0247	-.0032	.0030	.5438
7	259	16.32	6.00	70.77	.4778	.0494	.0358	-.0248	-.0031	.0031	.5441
7	260	20.55	6.00	68.91	.5736	.0628	.0327	-.0191	-.0004	.0066	.5411
7	261	20.55	6.00	68.87	.5728	.0617	.0324	-.0189	-.0004	.0067	.5411
7	262	24.87	6.00	67.84	.7144	.0791	.0304	-.0162	-.0011	.0091	-.0011
7	263	24.87	6.00	67.84	.7155	.0789	.0301	-.0163	.0010	.0092	.0047
7	264	20.55	6.00	68.89	.5703	.0648	.0321	-.0189	.0001	.0065	.0316
7	265	20.55	6.00	68.87	.5716	.0648	.0322	-.0188	.0002	.0065	.0257
7	266	7.87	6.00	75.62	.2795	.0464	.0418	-.0281	-.0038	.0047	.5442
7	267	7.87	6.00	75.61	.2805	.0464	.0417	-.0282	-.0038	.0047	.5442
7	268	-.57	6.00	94.46	.0294	.0441	.0365	-.0085	-.0027	.0014	.5459

WIND AXIS

MACH NUMBER= .19

RUN	TPR	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
7	242	-.57	6.00	92.54	.8107	.0722	.0398	.0398
7	243	-.57	6.00	91.54	.8670	.0344	.0370	.0396
7	244	-4.73	6.00	64.26	-1.7275	-.0732	.0432	.0423
7	245	-4.73	6.00	64.25	-1.7235	-.0732	.0442	.0424
7	246	-2.65	6.00	47.02	-.5400	-.0219	.0399	.0398
7	247	-2.65	6.00	45.73	-.5283	-.0209	.0399	.0393
7	248	-.56	6.00	90.37	.8117	.0365	.0396	.0396
7	249	-.56	6.00	90.94	.8355	.0374	.0398	.0408
7	250	1.54	6.00	90.46	2.0813	.0919	.0357	.0446
7	251	1.54	6.00	8 .46	2. 759	. 229	. 367	. 447
7	252	3.65	6.00	77.92	2.8502	.1524	.0375	.0435
7	253	3.65	6.00	77.92	2.8513	.1524	.0372	.0435
7	254	7.87	6.00	75.61	3.2509	.2723	.0358	.0415
7	255	7.84	6.00	75.60	3.2669	.2724	.0358	. 417
7	256	12.11	6. 0	73.59	2.8814	.3708	.0385	.1274
7	257	12.11	6.00	73.60	2.8973	.3707	.0386	.1271
7	258	15.32	6.00	73.35	2.7972	.4434	.0386	.1721
7	259	15.32	6.00	70.77	2.6942	.4444	.0315	.1729
7	260	2 .55	6.	68.91	2.215	.5256	.0382	.2373
7	261	20.53	6.00	69.87	2.7184	.5251	.0371	.2366
7	262	24.87	6.00	67.84	1.8995	.6273	.0443	.3315
7	263	24.87	6.00	67.84	1.9017	.6255	.0441	.3347
7	264	20.53	6.00	68.89	2.7159	.5227	. 4 4	.2358
7	265	20.53	6.00	69.87	2.7175	.5239	.0403	.2373
7	266	7.87	6.00	75.62	3.2256	.2711	.0378	.0440
7	267	7.87	6.00	75.61	3.2328	.2722	.0378	.0442
7	268	-.57	6.00	94.46	.7335	. 209	. 4	. 4 6

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
8	281	-.56	3.00	88.92	.0377	.0185	.0375	-.0098	-.0010	.0010	.0029
8	282	-.56	3.00	88.71	.0387	.0185	.0377	-.0089	-.0010	.0010	.0002
8	283	-4.76	3.00	64.22	-.0734	.0211	.0328	-.0010	-.0017	.0001	-.5483
8	284	-4.75	3.00	64.00	-.0725	.0221	.0328	-.0011	-.0018	.0001	-.5448
8	285	-2.66	3.00	47.66	-.0222	.0210	.0349	-.0040	-.0013	.0005	-.5089
8	286	-2.66	3.00	46.15	-.0212	.0209	.0351	-.0041	-.0013	.0006	-.5091
8	287	-.56	3.00	90.53	.0343	.0176	.0375	-.0086	-.0009	.0009	0.0000
8	288	-.56	3.00	89.65	.0356	.0175	.0375	-.0086	-.0009	.0009	0.0000
8	289	1.54	3.00	80.03	.0933	.0182	.0396	-.0135	-.0010	.0014	0.0000
8	290	1.54	3.00	80.03	.0933	.0183	.0395	-.0135	-.0010	.0013	0.0000
8	291	3.65	3.00	77.69	.1573	.0185	.0413	-.0191	-.0011	.0018	0.0000
8	292	3.65	3.00	77.70	.1573	.0185	.0410	-.0191	-.0011	.0017	0.0000
8	293	7.89	3.00	75.53	.2914	.0220	.0437	-.0290	-.0016	.0028	0.0000
8	294	7.89	3.00	75.50	.2916	.0219	.0440	-.0290	-.0016	.0029	0.0000
8	295	12.13	3.00	73.77	.4085	.0253	.0425	-.0335	-.0017	.0021	0.0000
8	296	12.13	3.00	73.74	.4096	.0254	.0425	-.0335	-.0017	.0020	0.0000
8	297	16.33	3.00	70.63	.4824	.0276	.0374	-.0244	.0010	-.0002	0.0000
8	298	16.33	3.00	70.63	.4824	.0285	.0371	-.0244	.0010	-.0002	0.0000
8	299	20.57	3.00	68.63	.5786	.0370	.0334	-.0177	.0018	.0034	0.0000
8	300	20.57	3.00	68.64	.5808	.0360	.0334	-.0178	.0019	.0034	0.0000
8	301	24.83	3.00	67.67	.7146	.0493	.0291	-.0150	-.0001	.0052	0.0000
8	302	24.83	3.00	67.69	.7167	.0493	.0291	-.0152	-.0001	.0052	0.0000
8	303	20.58	3.00	68.61	.5809	.0372	.0331	-.0177	.0019	.0034	0.0000
8	304	20.57	3.00	68.63	.5763	.0370	.0328	-.0176	.0018	.0033	0.0000
8	305	7.89	3.00	75.53	.2894	.0220	.0437	-.0288	-.0016	.0028	0.0000
8	306	7.89	3.00	75.54	.2903	.0220	.0437	-.0290	-.0016	.0028	0.0000

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
8	281	-.56	3.00	88.92	1.0013	.0381	.0166	.0380
8	282	-.56	3.00	88.71	1.0199	.0390	.0165	.0393
8	283	-4.76	3.00	64.22	-1.7692	-.0704	.0191	.0398
8	284	-4.75	3.00	64.00	-1.7474	-.0695	.0201	.0398
8	285	-2.66	3.00	47.66	-.5569	-.0206	.0190	.0369
8	286	-2.66	3.00	46.15	-.5270	-.0196	.0190	.0371
8	287	-.56	3.00	9 .53	.9132	.0347	.0156	.0380
8	288	-.56	3.00	89.65	.9472	.0360	.0156	.0380
8	289	1.54	3.00	80.03	2.1470	.0922	.0160	.0429
8	290	1.54	3.00	80.03	2.1469	.0922	.0160	.0429
8	291	3.65	3.00	77.69	2.9627	.1544	.0158	.0521
8	292	3.65	3.00	77.70	2.9787	.1543	.0158	.0518
8	293	7.89	3.00	75.53	3.3586	.2826	.0176	.0844
8	294	7.89	3.00	75.50	3.3402	.2828	.0175	.0847
8	295	12.13	3.00	73.77	3.0379	.3904	.0186	.1285
8	296	12.13	3.00	73.74	3.0407	.3916	.0187	.1288
8	297	16.33	3.00	70.63	2.6198	.4525	.0185	.1727
8	298	16.33	3.00	70.63	2.6235	.4525	.0195	.1725
8	299	20.57	3.00	68.63	2.2443	.5300	.0247	.2361
8	300	20.57	3.00	68.64	2.2459	.5320	.0236	.2369
8	301	24.88	3.00	67.67	1.9325	.6360	.0321	.3291
8	302	24.88	3.00	67.69	1.9329	.6380	.0321	.3301
8	303	2 .58	3.00	68.61	2.2481	.5322	.0248	.2368
8	304	20.57	3.00	68.63	2.2491	.5280	.0248	.2348
8	305	7.89	3.00	75.53	3.3380	.2806	.0176	.0841
8	306	7.89	3.00	75.54	3.3439	.2816	.0176	.0842

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
9	320	-.56	0.00	88.68	.0352	.0011	.0365	-.0031	-.0003	.0006	.0906
9	321	-.56	0.00	88.47	.0362	.0001	.0365	-.0083	-.0003	.0006	.0903
9	322	-4.76	0.00	64.43	-.0731	-.0011	.0314	-.0008	-.0000	.0004	.0894
9	323	-4.75	0.00	64.31	-.0720	-.0011	.0314	-.0009	-.0000	.0004	.0889
9	324	-2.66	0.00	45.38	-.0194	-.0000	.0338	-.0039	-.0002	.0006	.0912
9	325	-2.66	0.00	45.39	-.0194	-.0000	.0341	-.0039	-.0002	.0006	.0918
9	326	-.56	0.00	88.01	.0373	.0001	.0362	-.0084	-.0003	.0005	.0927
9	327	-.56	0.00	87.82	.0382	.0001	.0365	-.0085	-.0003	.0006	.0924
9	328	1.54	0.00	79.66	.0947	-.0018	.0381	-.0133	-.0000	.0006	.0938
9	329	1.54	0.00	79.66	.0947	-.0018	.0381	-.0133	-.0000	.0006	.0934
9	330	3.65	0.00	77.56	.1583	-.0000	.0402	-.0190	-.0002	.0006	.0935
9	331	3.65	0.00	77.52	.1594	-.0001	.0405	-.0190	-.0002	.0006	.0931
9	332	7.89	0.00	75.54	.2908	-.0014	.0428	-.0290	.0000	.0006	.0887
9	333	7.89	0.00	75.54	.2908	-.0014	.0428	-.0290	.0000	.0006	.0886
9	334	12.13	0.00	73.84	.4115	.0016	.0426	-.0340	.0001	-.0008	.0839
9	335	12.13	0.00	73.86	.4115	.0015	.0426	-.0341	.0001	-.0007	.0833
9	336	16.33	0.00	70.90	.4861	.0041	.0382	-.0259	.0008	-.0001	.0876
9	337	16.33	0.00	70.90	.4861	.0042	.0382	-.0259	.0008	-.0002	.0871
9	338	20.56	0.00	68.70	.5764	.0079	.0328	-.0180	.0012	-.0005	.0920
9	339	20.57	0.00	68.69	.5776	.0080	.0330	-.0180	.0012	-.0006	.0922
9	340	24.87	0.00	67.38	.7075	.0162	.0283	-.0128	.0037	-.0013	.0989
9	341	24.87	0.00	67.38	.7077	.0151	.0286	-.0128	.0038	-.0012	.0986
9	342	20.56	0.00	68.67	.5743	.0080	.0322	-.0178	.0012	-.0006	.0918
9	343	20.56	0.00	68.70	.5753	.0079	.0322	-.0180	.0012	-.0006	.0912
9	344	7.89	0.00	75.54	.2877	.0005	.0431	-.0287	-.0004	.0006	.0882
9	345	7.89	0.00	75.54	.2877	.0005	.0431	-.0287	-.0004	.0006	.0880

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
9	320	-.56	0.00	88.68	.9818	.0355	.0011	.0362
9	321	-.56	0.00	88.47	1.0097	.0365	.0001	.0362
9	322	-4.76	0.00	64.43	-1.8781	-.0702	-.0011	.0374
9	323	-4.75	0.00	64.31	-1.8544	-.0691	-.0011	.0373
9	324	-2.66	0.00	45.38	-.5135	-.0178	-.0000	.0347
9	325	-2.66	0.00	45.39	-.5089	-.0178	-.0000	.0350
9	326	-.56	0.00	88.01	1.0488	.0376	.0001	.0359
9	327	-.56	0.00	87.82	1.0680	.0386	.0001	.0361
9	328	1.54	0.00	79.66	2.3035	.0936	-.0018	.0406
9	329	1.54	0.00	79.66	2.3034	.0936	-.0018	.0406
9	330	3.65	0.00	77.56	3.0950	.1554	-.0001	.0512
9	331	3.65	0.00	77.52	3.0953	.1565	-.0001	.0506
9	332	7.89	0.00	75.54	3.4260	.2821	-.0014	.0823
9	333	7.89	0.00	75.54	3.4260	.2821	-.0014	.0824
9	334	12.13	0.00	73.84	3.0676	.3924	.0016	.1279
9	335	12.13	0.00	73.86	3.0699	.3934	.0015	.1281
9	336	16.33	0.00	70.90	2.6301	.4557	.0041	.1733
9	337	16.33	0.00	70.90	2.6301	.4557	.0042	.1733
9	338	20.56	0.00	68.70	2.2657	.5282	.0079	.2331
9	339	20.57	0.00	68.69	2.2632	.5292	.0080	.2338
9	340	24.87	0.00	67.38	1.9489	.6301	.0162	.3233
9	341	24.87	0.00	67.33	1.9471	.6300	.0151	.3236
9	342	20.56	0.00	68.67	2.2707	.5264	.0080	.2318
9	343	20.56	0.00	68.70	2.2712	.5273	.0079	.2322
9	344	7.89	0.00	75.54	3.3947	.2790	.0005	.0822
9	345	7.89	0.00	75.54	3.3948	.2790	.0005	.0822

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CP3
10	363	-.69	0.00	85.48	-.0745	.0019	.0386	.0148	-.0004	.0007	.0687
10	364	-.69	0.00	85.40	-.0736	.0019	.0386	.0146	-.0004	.0007	.0678
10	365	-4.91	0.00	78.00	-.2003	.0013	.0419	.0249	-.0004	.0007	.0715
10	366	-4.92	0.00	77.99	-.2024	.0014	.0422	.0251	-.0004	.0007	.0760
10	367	-2.81	0.00	80.29	-.1359	.0025	.0406	.0199	-.0005	.0008	.0515
10	368	-2.80	0.00	80.29	-.1350	.0025	.0406	.0199	-.0005	.0007	.0641
10	369	-.70	0.00	85.21	-.0743	.0039	.0389	.0147	-.0006	.0008	.0542
10	370	-.70	0.00	85.21	-.0747	.0029	.0389	.0147	-.0004	.0008	.0509
10	371	1.41	0.00	124.59	-.0163	.0034	.0357	.0095	-.0005	.0007	.0315
10	372	1.41	0.00	127.35	-.0153	.0034	.0354	.0095	-.0005	.0007	.0361
10	373	3.51	0.00	53.63	.0409	.0021	.0326	.0049	-.0005	.0006	.0304
10	374	3.51	0.00	54.13	.0421	.0021	.0326	.0048	-.0005	.0006	.0358
10	375	7.72	0.00	66.53	.1531	.0022	.0280	-.0015	-.0003	.0005	.0657
10	376	7.72	0.00	66.53	.1531	.0021	.0283	-.0015	-.0003	.0006	.0658
10	377	11.94	0.00	67.53	.2595	.0027	.0189	-.0051	-.0000	.0006	.1258
10	378	11.94	0.00	67.58	.2605	.0037	.0188	-.0052	-.0001	.0006	.1256
10	379	16.20	0.00	67.57	.3849	.0089	.0068	-.0077	.0002	.0000	.0990
10	380	16.21	0.00	67.58	.3859	.0089	.0068	-.0078	.0003	.0001	.0964
10	381	20.50	0.00	67.16	.5194	.0107	-.0067	-.0083	.0006	-.0003	.0858
10	382	20.50	0.00	67.14	.5195	.0117	-.0067	-.0082	.0005	-.0003	.0706
10	383	24.84	0.00	66.29	.6678	.0269	-.0156	-.0048	.0012	-.0010	-.0096
10	384	24.83	0.00	66.27	.6645	.0258	-.0156	-.0045	.0013	-.0010	-.0135
10	385	20.50	0.00	67.19	.5240	.0096	-.0067	-.0085	.0005	-.0003	.0552
10	386	20.51	0.00	67.20	.5250	.0118	-.0065	-.0085	.0004	-.0003	.0557
10	387	7.72	0.00	66.59	.1518	.0041	.0280	-.0015	-.0006	.0006	.0639
10	388	7.72	0.00	66.54	.1519	.0041	.0280	-.0015	-.0006	.0006	.0654
10	389	-.69	0.00	85.26	-.0738	.0039	.0386	.0145	-.0006	.0008	.0259

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
10	363	-.69	0.00	85.48	-1.8747	-.0740	.0019	.0395
10	364	-.69	0.00	85.40	-1.8540	-.0731	.0019	.0395
10	365	-4.91	0.00	78.00	-3.3289	-.1959	.0013	.0589
10	366	-4.92	0.00	77.99	-3.3349	-.1980	.0014	.0594
10	367	-2.80	0.00	80.29	-2.8155	-.1329	.0025	.0472
10	368	-2.80	0.00	80.29	-2.8156	-.1329	.0025	.0472
10	369	-.70	0.00	85.21	-1.8680	-.0743	.0039	.0398
10	370	-.70	0.00	85.21	-1.8675	-.0743	.0029	.0398
10	371	1.41	0.00	124.59	-.4852	-.0172	.0034	.0353
10	372	1.41	0.00	127.35	-.4619	-.0162	.0034	.0350
10	373	3.51	0.00	53.63	1.1079	.0389	.0021	.0351
10	374	3.51	0.00	54.13	1.1376	.0400	.0021	.0351
10	375	7.72	0.00	66.53	3.0510	.1479	.0022	.0483
10	376	7.72	0.00	66.53	3.0426	.1479	.0021	.0486
10	377	11.94	0.00	67.53	3.4663	.2501	.0027	.0721
10	378	11.94	0.00	67.58	3.4698	.2510	.0037	.0723
10	379	16.20	0.00	67.57	3.2271	.3677	.0089	.1139
10	380	16.20	0.00	67.58	3.2273	.3687	.0089	.1142
10	381	20.51	0.00	67.16	2.7845	.4889	.0107	.1756
10	382	20.50	0.00	67.14	2.7843	.4890	.0117	.1756
10	383	24.84	0.00	66.29	2.2997	.6125	.0269	.2664
10	384	24.83	0.00	66.27	2.3011	.6096	.0258	.2649
10	385	20.50	0.00	67.19	2.7826	.4931	.0096	.1772
10	386	20.51	0.00	67.20	2.7775	.4940	.0118	.1778
10	387	7.72	0.00	66.59	3.0452	.1466	.0041	.0481
10	388	7.72	0.00	66.54	3.0464	.1467	.0041	.0482
10	389	-.69	0.00	85.26	-1.8582	-.0733	.0039	.0395

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
11	402	-.70	3.00	84.56	-.0753	.0180	.0393	.0143	-.0005	.0013	-.4910
11	403	-.70	3.00	84.56	-.0753	.0180	.0395	.0143	-.0004	.0013	-.4879
11	404	-4.92	3.00	77.76	-.2045	.0209	.0429	.0249	-.0009	.0002	-.4664
11	405	-4.92	3.00	77.77	-.2024	.0219	.0425	.0247	-.0009	.0003	-.4682
11	406	-2.81	3.00	79.73	-.1383	.0183	.0411	.0196	-.0004	.0008	-.4725
11	407	-2.80	3.00	79.80	-.1371	.0192	.0410	.0195	-.0005	.0009	-.4767
11	408	1.30	3.00	84.23	-.0766	.0210	.0273	.0143	-.0006	.0013	-.4887
11	411	1.40	3.00	113.93	-.0191	.0209	.0364	.0092	-.0009	.0018	-.4967
11	412	1.40	3.00	117.16	-.0179	.0211	.0364	.0092	-.0010	.0017	-.4970
11	413	3.50	3.00	52.60	.0377	.0243	.0336	.0049	-.0017	.0021	-.5111
11	414	3.50	3.00	53.16	.0388	.0242	.0339	.0048	-.0017	.0022	-.5165
11	415	7.71	3.00	66.44	.1471	.0269	.0284	-.0013	-.0025	.0030	-.4724
11	416	7.71	3.00	66.45	.1471	.0269	.0281	-.0013	-.0025	.0030	-.4704
11	417	11.94	3.00	67.52	.2586	.0277	.0195	-.0050	-.0024	.0038	-.4372
11	418	11.94	3.00	67.52	.2586	.0286	.0195	-.0050	-.0024	.0039	-.4336
11	419	16.20	3.00	67.39	.3814	.0352	.0067	-.0069	-.0022	.0041	-.4993
11	420	16.20	3.00	67.39	.3814	.0352	.0067	-.0069	-.0022	.0041	-.5028
11	421	20.49	3.00	67.02	.5135	.0450	-.0062	-.0075	-.0010	.0039	-.5096
11	422	20.49	3.00	67.02	.5136	.0449	-.0062	-.0075	-.0010	.0040	-.5114
11	423	24.82	3.00	66.33	.6614	.0523	-.0143	-.0050	-.0001	.0053	0.0000
11	424	24.82	3.00	66.35	.6624	.0523	-.0145	-.0051	-.0001	.0054	0.0000
11	425	20.49	3.00	67.02	.5135	.0460	-.0062	-.0075	-.0010	.0040	-.5384
11	426	20.49	3.00	67.02	.5135	.0460	-.0062	-.0074	-.0010	.0040	-.5352
11	427	7.71	3.00	66.50	.1483	.0259	.0278	-.0014	-.0025	.0029	-.4813
11	428	7.71	3.00	66.50	.1483	.0258	.0278	-.0014	-.0025	.0030	-.4796

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
11	402	-.70	3.00	84.56	-1.8224	-.0748	.0159	.0411
11	403	-.70	3.00	84.56	-1.8101	-.0748	.0158	.0413
11	404	-4.92	3.00	77.76	-3.2659	-.2000	.0177	.0612
11	405	-4.92	3.00	77.77	-3.2563	-.1980	.0187	.0608
11	406	-2.81	3.00	79.73	-2.7960	-.1361	.0157	.0487
11	407	-2.80	3.00	79.60	-2.7745	-.1350	.0167	.0486
11	408	1.30	3.00	84.23	-2.9069	-.0772	.0187	.0256
11	411	1.40	3.00	113.93	-.5400	-.0200	.0190	.0370
11	412	1.40	3.00	117.16	-.5076	-.0188	.0192	.0370
11	413	3.50	3.00	52.60	.9588	.0355	.0224	.0371
11	414	3.50	3.00	53.16	.9794	.0366	.0223	.0374
11	415	7.71	3.00	66.44	2.8837	.1420	.0244	.0492
11	416	7.71	3.00	66.45	2.9011	.1420	.0243	.0490
11	417	11.94	3.00	67.52	3.3686	.2489	.0238	.0739
11	418	11.94	3.00	67.52	3.3660	.2489	.0248	.0740
11	419	16.20	3.00	67.39	3.1833	.3644	.0292	.1145
11	420	16.20	3.00	67.39	3.1833	.3644	.0293	.1145
11	421	20.49	3.00	67.02	2.7455	.4832	.0359	.1760
11	422	20.49	3.00	67.02	2.7455	.4833	.0358	.1760
11	423	24.82	3.00	66.33	2.2702	.6063	.0384	.2671
11	424	24.82	3.00	66.35	2.2725	.6073	.0383	.2672
11	425	20.49	3.00	67.02	2.7446	.4832	.0368	.1761
11	426	20.49	3.00	67.02	2.7446	.4832	.0368	.1760
11	427	7.71	3.00	66.50	2.9368	.1432	.0234	.0488
11	428	7.71	3.00	66.50	2.9372	.1432	.0233	.0488

BODY AXIS

MACH NUMBER= .19

RUN	TRN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
12	443	-.70	6.00	84.11	-.0740	.0443	.0396	.0137	-.0018	.0019	-.5189
12	444	-.7[illegible]	6.[illegible]	84.11	-.[illegible]740	.[illegible]443	.[illegible]396	.0137	-.0018	.0019	-.5185
12	445	-4.91	6.00	77.68	-.1957	.0430	.0436	.0238	-.0026	.[illegible]001	-.4831
12	446	-4.91	6.00	77.64	-.1969	.0490	.0430	.0238	-.0027	.0001	-.4869
12	447	-2.80	6.00	79.76	-.1324	.0429	.0412	.0138	-.0017	.0011	-.5022
12	448	-2.80	6.00	79.77	-.1335	.[illegible]441	.[illegible]415	.[illegible]13[illegible]	-.[illegible]18	.[illegible]011	-.5[illegible]24
12	449	-.69	6.00	84.52	-.0707	.0412	.0393	.0134	-.0016	.0019	-.5046
12	450	-.69	6.00	84.48	-.0717	.0422	.0396	.0136	-.0017	.0019	-.5219
12	451	1.41	6.00	123.62	-.0150	.0419	.0366	.0087	-.0018	.0027	-.5345
12	452	1.41	6.00	131.19	-.0129	.0428	.0366	.[illegible]085	-.[illegible]019	.[illegible]027	-.5342
12	453	3.51	6.[illegible]	55.88	.0429	.0467	.0337	.0042	-.0028	.0034	.0057
12	454	3.51	6.00	55.88	.0429	.0465	.0337	.0042	-.0028	.0034	.0045
12	455	7.72	6.00	66.90	.1530	.0492	.0280	-.0020	-.0041	.0052	-.5206
12	456	7.72	6.00	66.90	.1530	.0492	.0277	-.0020	-.0041	.0052	-.5232
12	457	11.94	6.[illegible]	67.66	.2615	.[illegible]549	.[illegible]139	-.0055	-.0049	.0068	-.5329
12	458	11.94	6.00	67.68	.2627	.0559	.0139	-.0055	-.[illegible]051	.[illegible]068	-.5716
12	459	15.20	6.00	67.31	.3821	.0541	.0075	-.0056	-.0048	.0077	0.0000
12	460	15.20	6.00	67.34	.3830	.0542	.0075	-.0058	-.0048	.0076	0.0000
12	461	20.50	6.00	67.[illegible]4	.5181	.[illegible]742	-.[illegible]061	-.[illegible]076	-.[illegible]051	.[illegible]082	.
12	462	20.50	6.00	67.06	.5203	.0752	-.0061	-.0077	-.[illegible]032	.0083	0.[illegible]
12	463	24.85	6.00	66.49	.6753	.0849	-.0143	-.0052	-.0004	.0104	0.0000
12	464	24.85	6.00	66.49	.6753	.0859	-.0143	-.0052	-.0005	.0105	0.0000
12	465	7.72	6.00	66.57	.1501	.0504	.0277	-.0015	-.0041	.0051	-.5238
12	466	7.72	6.00	66.57	.1500	.0514	.0277	-.0015	-.0042	.0051	-.5248

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
12	443	-.70	6.00	84.11	-1.6367	-.0735	.0398	.0449
12	444	-.70	6.00	84.11	-1.6367	-.0735	.0398	.0449
12	445	-4.91	6.00	77.68	-2.9856	-.1923	.0415	.0644
12	446	-4.91	6.00	77.64	-2.9825	-.1925	.0425	.0645
12	447	-2.80	6.00	79.76	-2.5143	-.1363	.0377	.0518
12	448	-2.80	6.00	79.77	-2.5109	-.1313	.0387	.0523
12	449	-.69	6.00	84.52	-1.5882	-.0702	.0358	.0442
12	450	-.69	6.00	84.48	-1.5956	-.0712	.0378	.0446
12	451	1.41	6.00	123.62	-.3921	-.0159	.0378	.0404
12	452	1.41	6.00	131.19	-.3399	-.0138	.0388	.0405
12	453	3.51	6.00	55.88	.9956	.0408	.0426	.0409
12	454	3.51	6.00	55.88	.9957	.0408	.0426	.0409
12	455	7.72	6.00	66.90	2.7918	.1479	.0439	.0572
12	456	7.72	6.00	66.90	2.7974	.1479	.0439	.0529
12	457	11.94	6.00	67.66	3.2345	.2521	.0470	.0779
12	458	11.94	6.00	67.68	3.2347	.2531	.0480	.0793
12	459	16.21	6.00	67.31	3.0422	.3548	.0519	.1139
12	460	16.20	6.00	67.34	3.0470	.3557	.0519	.1202
12	461	20.50	6.00	67.06	2.6714	.4875	.0555	.1827
12	462	20.50	6.00	67.06	2.6696	.4895	.0554	.1834
12	463	24.83	6.00	66.49	2.2245	.6188	.0561	.2782
12	464	24.85	6.00	66.49	2.2237	.6188	.0571	.2793
12	465	7.72	6.00	66.57	2.7536	.1450	.0452	.0526
12	466	7.72	6.00	66.57	2.7483	.1450	.0461	.0527

BODY AXIS

MACH NUMBER= .19

RUN	TRN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPR
13	483	-.64	0.00	79.73	-.0237	-.0018	.0374	.0033	-.0011	-.0055	.0[illegible]
13	484	-.63	0.00	80.93	-.0194	-.0008	.0373	.0030	-.0012	-. 55	. 58[illegible]
13	485	-4.24	.[illegible]	74. 8	-.1395	.[illegible]1	.0362	.0119	-.0021	-.0052	.075[illegible]
13	486	-4.23	0.00	74.14	-.1351	.0002	.0362	.0116	-.0020	-.0052	.[illegible]74[illegible]
13	487	-2.71	0.00	75.11	-.0979	.0001	.0371	.0072	-.0016	-.0056	.0[illegible]
13	488	-2.71	0.00	75.10	-.0979	.0001	.0368	.0072	-.0016	-.0056	.0[illegible]
13	489	-.64	. [illegible]	79.66	-. 226	-.[illegible]19	. 371	.[illegible]72	-. 12	-. 55	.0[illegible]
13	490	-.63	0.00	80.44	-.0204	-.0009	.0371	.0030	-.[illegible]13	-.[illegible]55	.[illegible]51[illegible]
13	491	1.47	[illegible].0	70.91	.0356	-.0002	.0369	-.0019	-.0011	-.00[illegible]9	.04[illegible]
13	492	1.43	0.00	71.04	.0455	-.0000	.0365	-.0025	-.0010	-.0055	.0[illegible]
13	493	3.59	0.00	72.62	.1035	. [illegible]8	. [illegible]67	-. [illegible]73	-. 12	-. 58	. [illegible]
13	494	3.59	0.00	72.62	.1035	.0008	.0367	-.0073	-.0012	-.0059	. [illegible]81
13	495	7.81	0.00	72.47	.2237	.0019	.0349	-.0154	-.0010	-.00[illegible]9	.07[illegible]
13	496	7.81	0.00	72.47	.2235	.0019	.0349	-.0154	-.0010	-.0059	.07[illegible]
13	497	12.03	0.00	71.63	.3307	.0009	.0300	-.0204	.0007	-. 78	.1[illegible]
13	498	12. 4	. [illegible]	71.64	.3379	.[illegible]9	.0303	-.0205	.0007	-.0079	.1[illegible]
13	500	16.23	0.00	69.72	.4585	.0025	.0238	-.[illegible]97	.0015	-.[illegible]54	.[illegible]
13	501	16.23	0.00	69.72	.4472	.0014	.0230	-.0185	.0015	-.00[illegible]4	.[illegible]
13	502	20.52	0.00	67.94	.5435	.0028	.0140	-.0129	.0011	-.0012	.0[illegible]
13	503	20.52	. [illegible]	67.94	.5436	.[illegible]28	. 14[illegible]	-. 129	.[illegible] 11	-. 12	.0[illegible]
13	505	24.86	0.00	66.88	.6919	.0024	.0081	-.[illegible]091	.[illegible]52	-.[illegible]1[illegible]	.5[illegible]
13	506	24.85	[illegible].00	66.89	.6929	.0034	.0081	-.0091	.0051	-.0012	.[illegible]
13	507	20.53	0.00	67.97	.5493	-.0000	.0137	-.0132	.0013	-.0017	.04[illegible]
13	508	20.54	0.00	69.01	.5547	-.0001	. 136	-. 135	. 13	-. 17	. 41[illegible]
13	509	7.81	[illegible].00	72.48	.2171	-.0007	.0355	-.0150	-.0009	-.0070	.0744
13	510	7.81	0.00	72.51	.2214	-.0004	.0352	-.0154	-.0009	-.0069	.07[illegible]

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
13	483	-.64	[illegible]	79.73	-.6173	-.0232	-.0018	.0377
13	484	-.63	0.00	80.93	-.5047	-.0190	-.0008	.0375
13	485	-4.84	0.00	74.08	-2.8405	-.1359	.0001	.0479
13	486	-4.83	0.00	74.14	-2.7752	-.1316	.0002	.0474
13	487	-2.71	[illegible]	76.11	-1.6419	-.0961	.0001	.0413
13	488	-2.71	0.00	76.10	-1.6539	-.0961	.0001	.0410
13	489	-.64	0.00	79.66	-.5941	-.0222	-.0019	.0373
13	490	-.63	0.00	80.44	-.5359	-.0200	-.0009	.0373
13	491	1.47	0.00	70.91	.9177	.0347	-.0002	.0378
13	492	1.43	0.00	71.04	1.1941	.0446	-.0000	.0376
13	493	3.53	0.00	72.62	2.7464	.1019	.0008	.0431
13	494	3.59	0.00	72.62	2.7464	.1010	.0009	.0431
13	495	7.81	0.00	72.43	3.3871	.2169	.0019	.0630
13	496	7.81	[illegible]	72.47	3.3759	.2167	.0019	.0630
13	497	12.03	0.00	71.63	3.2416	.3221	.0019	.0994
13	498	12.04	0.00	71.64	3.2384	.3241	.0009	.1001
13	500	16.29	0.00	69.72	2.8595	.4260	.0025	.1484
13	501	16.29	[illegible]	69.72	2.8668	.4228	.0014	.1475
13	502	20.52	0.00	67.94	2.4757	.5042	.0028	.2037
13	503	20.52	0.00	67.94	2.4756	.5042	.0028	.2037
13	505	24.86	0.00	66.88	2.0934	.6243	.0024	.2982
13	506	24.86	0.00	66.89	2.0933	.6253	.0034	.2987
13	507	20.53	0.00	67.97	2.4804	.5096	-.0000	.2054
13	508	20.54	0.00	68.01	2.4812	.5146	-.0001	.2074
13	509	7.80	0.00	72.48	3.2515	.2103	-.0003	.0647
13	510	7.81	0.00	72.51	3.3122	.2145	-.0004	.0665

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPO
14	526	-.63	3.00	75.48	-.0158	.0178	.0372	.0016	-.0018	-.0050	-.466
14	527	-.63	3.00	75.48	-.0158	.0177	.0372	.0016	-.0018	-.0050	-.469
14	528	-4.84	3.00	73.64	-.1363	.0217	.0364	.0110	-.0032	-.0065	-.477
14	529	-4.84	3.00	73.58	-.1353	.0227	.0364	.0108	-.0033	-.0065	-.476
14	530	-2.73	3.00	74.34	-.0773	.0181	.0363	.0068	-.0022	-.0056	-.49
14	531	-2.73	3.00	74.36	-.0774	.0191	.0369	.0068	-.0023	-.0055	-.497
14	532	-.63	3.00	76.29	-.0185	.0157	.0367	.0020	-.0017	-.0050	-.5
14	533	-.63	3.00	76.30	-.0186	.0157	.0370	.0020	-.0017	-.0050	-.498
14	534	1.46	3.00	73.42	.0354	.0167	.0365	-.0029	-.0016	-.0046	-.503
14	535	1.47	3.00	73.39	.0374	.0177	.0366	-.0029	-.0019	-.0046	-.508
14	536	3.58	3.00	73.55	.0888	.0203	.0365	-.0079	-.0021	-.0045	-.515
14	537	3.58	3.00	73.55	.0893	.0203	.0368	-.0079	-.0021	-.0045	-.518
14	538	7.80	3.00	72.85	.2191	.0230	.0338	-.0159	-.0025	-.0045	-.341
14	539	7.80	3.00	72.35	.2191	.0230	.0338	-.0159	-.0025	-.0044	-.341
14	54	12.04	3.00	71.83	.3393	.0248	.0296	-.0214	-.0017	-.0045	-.304
14	541	12.04	3.00	71.86	.3394	.0248	.0294	-.0213	-.0017	-.0045	-.307
14	542	16.28	3.00	69.95	.4468	.0275	.0215	-.0196	-.0003	-.0020	-.370
14	543	16.28	3.00	69.94	.4469	.0285	.0215	-.0195	-.0003	-.0021	-.371
14	544	20.53	3.00	67.93	.5461	.0335	.0129	-.0152	.0013	.0030	-.392
14	545	20.53	3.00	68.01	.5492	.0336	.0131	-.0134	.0013	.0029	-.394
14	546	24.85	3.00	67.15	.6832	.0323	.0066	-.0110	.0026	.0054	-.474
14	547	24.86	3.00	67.14	.6834	.0323	.0066	-.0109	.0027	.0055	-.473
14	548	20.54	3.00	67.99	.5552	.0338	.0128	-.0134	.0014	.0030	-.418
14	549	20.55	3.00	68.01	.5584	.0348	.0128	-.0135	.0013	.0030	-.419
14	550	7.81	3.00	72.76	.2249	.0211	.0340	-.0152	-.0023	-.0045	-.33
14	551	7.82	3.00	72.78	.2313	.0211	.0334	-.0157	-.0023	-.0045	-.350
14	552	-.63	3.00	76.57	-.0155	.0157	.0370	.0017	-.0017	-.0051	-.501

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
14	526	-.63	3.00	75.48	-.4017	-.0154	.0158	.0393
14	527	-.63	3.00	75.48	-.4016	-.0154	.0158	.0393
14	528	-4.84	3.00	73.64	-2.7157	-.1327	.0192	.0499
14	529	-4.84	3.00	73.58	-2.6988	-.1317	.0201	.0498
14	530	-2.73	3.00	74.34	-1.8493	-.0755	.0160	.0408
14	531	-2.73	3.00	74.36	-1.8221	-.0755	.0169	.0415
14	532	-.63	3.00	76.29	-.4830	-.0182	.0137	.0377
14	533	-.63	3.00	76.30	-.4793	-.0182	.0137	.0380
14	534	1.46	3.00	73.42	.0232	.0354	.0147	.0384
14	535	1.47	3.00	73.39	.0499	.0355	.0157	.0394
14	536	3.58	3.00	73.55	2.2116	.0963	.0190	.0435
14	537	3.58	3.00	73.55	2.2116	.0963	.0190	.0435
14	538	7.80	3.00	72.85	3.3023	.2125	.0197	.0613
14	539	7.80	3.00	72.85	3.3024	.2125	.0196	.0643
14	54	12.04	3.00	71.88	3.2274	.3257	.0195	.1009
14	541	12.04	3.00	71.86	3.2370	.3259	.0195	.1007
14	542	15.26	3.00	69.95	2.8741	.4229	.0198	.1471
14	543	15.28	3.00	69.94	2.8729	.4220	.0209	.1472
14	544	20.53	3.00	67.98	2.4725	.5169	.0228	.2050
14	545	20.53	3.00	68.01	2.4693	.5187	.0228	.2060
14	546	24.85	3.00	67.15	2.0971	.6252	.0157	.2095
14	547	24.85	3.00	67.14	2.0971	.6254	.0166	.2087
14	548	20.54	3.00	67.99	2.4735	.5154	.0229	.2094
14	549	20.55	3.00	68.01	2.4734	.5184	.0239	.2096
14	550	7.81	3.00	72.76	3.3415	.2191	.0177	.0653
14	551	7.82	3.00	72.78	3.3939	.2245	.0177	.0661
14	552	-.63	3.00	76.57	-.3971	-.0151	.0138	.0379

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CP3
15	568	-.62	6.00	70.98	-.0116	.0462	.0370	.0006	-.0037	-.0044	.1268
15	569	-.62	6.00	70.71	-.0094	.0472	.0371	.0005	-.0038	-.0044	.0202
15	570	-4.83	6.00	72.84	-.1282	.0537	.0367	.0033	-.0057	-.0065	.0701
15	571	-4.82	6.00	72.85	-.1280	.0537	.0366	.0092	-.0037	-.0065	.0685
15	572	-2.72	6.00	73.37	-.0678	.0468	.0354	.0053	-.0042	-.0052	.0432
15	573	-2.72	6.00	73.37	-.0679	.0468	.0364	.0057	-.0042	-.0052	.1419
15	574	-.62	6.00	70.14	-.0107	.0481	.0367	.0005	-.0039	-.0043	.1264
15	575	-.62	6.00	70.13	-.0107	.0482	.0367	.0005	-.0039	-.0043	.1265
15	576	1.68	6.00	75.12	.0456	.0458	.0362	-.0043	-.0035	-.0036	.1267
15	577	1.43	6.00	75.11	.0456	.0459	.0362	-.0043	-.0035	-.0035	.1267
15	578	3.59	6.00	74.11	.1061	.0500	.0356	-.0091	-.0040	-.0031	.1267
15	579	3.59	6.00	74.11	.1060	.0510	.0356	-.0091	-.0041	-.0031	.1267
15	580	7.81	6.00	72.91	.2229	.0537	.0321	-.0154	-.0048	-.0023	.1265
15	581	7.81	6.00	72.94	.2239	.0537	.0324	-.0165	-.0047	-.0022	.1267
15	582	12.04	6.00	71.73	.3411	.0588	.0268	-.0210	-.0051	-.0009	.1265
15	583	12.04	6.00	71.73	.3422	.0599	.0268	-.0211	-.0052	-.0009	.1265
15	584	16.28	6.00	69.84	.4473	.0595	.0198	-.0191	-.0025	.0017	.1263
15	585	16.28	6.00	69.84	.4473	.0595	.0198	-.0191	-.0025	.0017	.1263
15	586	20.55	6.00	68.21	.5584	.0684	.0115	-.0147	-.0009	.0067	.1260
15	587	20.54	6.00	68.19	.5562	.0693	.0116	-.0146	-.0010	.0069	.1261
15	588	24.88	6.00	67.32	.7087	.0697	.0057	-.0124	.0038	.0101	.1259
15	589	24.88	6.00	67.33	.7086	.0697	.0057	-.0125	.0038	.0101	.1258
15	590	20.55	6.00	68.18	.5585	.0704	.0119	-.0146	-.0011	.0068	.1261
15	591	20.54	6.00	68.17	.5539	.0714	.0116	-.0144	-.0011	.0067	.1261
15	594	7.81	6.00	72.86	.2229	.0579	.0333	-.0162	-.0050	-.0022	.1269
15	595	7.81	6.00	72.86	.2229	.0578	.0330	-.0162	-.0050	-.0022	.1269

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
15	568	-.62	6.00	70.98	-.2675	-.0112	.0420	.0418
15	569	-.62	6.00	70.70	-.2153	-.0090	.0430	.0418
15	570	-4.83	6.00	72.84	-2.3667	-.1247	.0484	.0527
15	571	-4.82	6.00	72.85	-2.3347	-.1225	.0485	.0525
15	572	-2.72	6.00	73.37	-1.4910	-.0660	.0424	.0442
15	573	-2.72	6.00	73.37	-1.4910	-.0660	.0424	.0442
15	574	-.62	6.00	70.14	-.2469	-.0103	.0440	.0417
15	575	-.62	6.00	70.13	-.2469	-.0103	.0440	.0417
15	576	1.48	6.00	75.12	1.0607	.0445	.0426	.0471
15	577	1.48	6.00	75.11	1.0609	.0446	.0426	.0471
15	578	3.59	6.00	74.11	2.1951	.1035	.0453	.0472
15	579	3.59	6.00	74.11	2.1902	.1036	.0453	.0473
15	580	7.81	6.00	72.91	3.2147	.2165	.0469	.0674
15	581	7.81	6.00	72.94	3.2986	.2174	.0469	.0679
15	582	12.04	6.00	71.73	3.1857	.3280	.0483	.1070
15	583	12.04	6.00	71.73	3.1853	.3291	.0493	.1073
15	584	16.29	6.00	69.84	2.8284	.4278	.0442	.1498
15	585	16.29	6.00	69.84	2.8286	.4238	.0442	.1498
15	586	20.55	6.00	68.21	2.4277	.5193	.0464	.2128
15	587	20.54	6.00	68.19	2.4361	.5168	.0474	.2121
15	588	24.88	6.00	67.32	2.0725	.6405	.0376	.3091
15	589	24.88	6.00	67.33	2.0726	.6404	.0376	.3090
15	590	20.55	6.00	68.18	2.4316	.5189	.0434	.2114
15	591	20.54	6.00	68.17	2.4329	.5146	.0496	.2115
15	594	7.81	6.00	72.88	3.1879	.2163	.0510	.0649
15	595	7.81	6.00	72.85	3.1514	.2163	.0509	.0646

BODY AXIS

MACH NUMBER= .19

RUN	TEN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CA
17	655	-.63	-3.00	83.46	-.0221	-.0188	.0363	.0040	-.0011	-.0060	-.0
17	656	-.63	-3.00	83.47	-.0221	-.0188	.0363	.0040	-.0011	-.0060	.0
17	657	-4.84	-3.00	74.69	-.1390	-.0227	.0356	.0127	-.0009	-.0057	.0
17	658	-4.84	-3.	74.69	-.1	-. 225	.0356	.0127	-. 9	-.0059	.0
17	659	-2.74	-3.00	76.35	-.0819	-.0224	.0360	.0098	-.0009	-.0057	.0
17	660	-2.74	-3.	76.35	-.0819	-.0214	.0357	.0098	-.0009	-.0057	.0
17	661	-.63	-3.00	83.35	-.0231	-.0198	.0363	.0041	-.0009	-.0061	-.0
17	662	-.63	-3.00	83.34	-.0232	-. 197	.0363	.0041	-. 1	-. 5	.0
17	663	1.47	-3.00	68.35	.0350	-.0195	.0366	-.0010	-.0005	-.	-.
17	664	1.47	-3.	68.35	.0353	-.0174	.0363	-.0010	-.0004	-.00	-.0
17	665	3.57	-3.00	71.83	.0921	-.0219	.0355	-.0076	.0000	-.0073	-.0
17	666	3.57	-3.00	71.83	.0921	-.0219	.0355	-. 5	.	-. 7	.0
17	667	7.79	-3.	71.83	.2113	-.0233	.0346	-.0132	.0011	-.0094	.0
17	668	7.79	-3.	71.83	.2113	-.0233	.0346	-.0132	.0011	-.0094	.0
17	669	12.02	-3.00	70.82	.3250	-.0274	.0302	-.0171	.0030	-.0101	.0
17	670	12.02	-3.00	70.79	.3241	-.0274	.0302	-.0159	.0030	-.0101	.0
17	671	17.61	-3.	7 .98	1.1052	-. 159	.0214	-.0630	.0009	-.0057	.0
17	672	17.44	-3.00	70.85	1.0729	-.0160	.0211	-.0 57	.0009	-. 9	.0
17	673	20.53	-3.00	67.59	.5444	-.0332	.0136	-.0115	.0023	-.0061	.0
17	674	20.53	-3.00	67.67	.5445	-.0332	.0136	-.0114	.0025	-.0061	.0
17	676	24.85	-3.	66.89	.6883	-. 385	. 93	-. 191	. 5	-. 59	.0
17	677	24.85	-3.00	66.89	.6883	-.0334	.0093	-.0071	.0049	-.0059	.0
17	678	20.53	-3.00	67.70	.5443	-.0313	.0136	-.0116	.0023	-.0060	.0
17	679	20.53	-3.00	67.71	.5441	-.0313	.0136	-.0117	.0023	-.0060	.0
17	680	7.80	-3.00	71.92	.2142	-.0212	.0346	-. 176	. 11	-. 93	.0
17	681	7.80	-3.00	71.96	.2152	-.0222	.0346	-.0139	.0011	-.0094	.0

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
17	655	-.63	-3.00	83.46	-.5800	-.0217	-.0169	.0375
17	656	-.63	-3.00	83.47	-.5811	-.0217	-.0169	.0375
17	657	-4.84	-3.00	74.69	-2.8024	-.1355	-.0202	.0494
17	658	-4.84	-3.00	74.69	-2.8026	-.1355	-.0201	.0494
17	659	-2.74	-3.00	76.35	-1.9522	-.0800	-.0203	.0410
17	660	-2.74	-3.00	76.35	-1.9599	-.0801	-.0193	.0416
17	661	-.63	-3.00	83.35	-.6049	-.0227	-.0179	.0375
17	662	-.63	-3.00	83.34	-.6070	-.0229	-.0158	.0375
17	663	1.47	-3.00	68.35	.8924	.0340	-.0175	.0391
17	664	1.47	-3.00	68.35	.8912	.0340	-.0185	.0392
17	665	3.57	-3.00	71.63	2.1253	.0807	-.0197	.0412
17	666	3.57	-3.00	71.63	2.1252	.0807	-.0198	.0422
17	667	7.79	-3.00	71.83	3.1960	.2040	-.0200	.0641
17	668	7.79	-3.00	71.83	3.1931	.2046	-.0200	.0641
17	669	12.02	-3.00	70.82	3.1622	.3116	-.0222	.0995
17	670	12.02	-3.00	70.79	3.1589	.3107	-.0222	.0993
17	671	17.61	-3.00	70.98	2.9594	1.1041	.0036	.3732
17	672	17.44	-3.00	70.85	2.9738	1.0172	.0010	.3421
17	673	20.53	-3.00	67.69	2.4623	.5051	-.0225	.2051
17	674	20.53	-3.00	67.67	2.4623	.5052	-.0225	.2052
17	676	24.85	-3.00	66.89	2.0734	.6217	-.0239	.2994
17	677	24.85	-3.00	66.89	2.0738	.6205	-.0228	.2993
17	678	20.53	-3.00	67.70	2.4636	.5049	-.0209	.2050
17	679	20.53	-3.00	67.71	2.4637	.5048	-.0206	.2049
17	680	7.80	-3.00	71.92	3.2247	.2073	-.0178	.0647
17	681	7.80	-3.00	71.96	3.2313	.2085	-.0199	.0645

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPN
18	697	-.63	-6.00	83.86	-.0228	-.0446	.0372	.0042	.0006	-.0066	-.0002
18	698	-.63	-6.00	83.99	-.0218	-.0446	.0372	.0040	.0006	-.0066	-.0002
18	699	-4.84	-6.00	74.91	-.1384	-.0485	.0360	.0129	.0007	-.0054	-.0008
18	700	-4.84	-6.00	74.91	-.1383	-.0485	.0358	.0129	.0008	-.0054	-.0008
18	701	-2.74	-6.00	76.64	-.0823	-.0457	.0361	.0091	.0004	-.0059	-.0005
18	702	-2.74	-6.00	76.59	-.0813	-.0466	.0361	.0090	.0006	-.0059	-.0005
18	703	-.64	-6.00	83.32	-.0239	-.0445	.0372	.0042	.0006	-.0066	-.0002
18	704	-.63	-6.00	83.87	-.0228	-.0446	.0375	.0042	.0005	-.0066	-.0001
18	705	1.47	-6.00	67.28	.0335	-.0449	.0366	-.0016	.0011	-.0075	.0002
18	706	1.47	-6.00	67.28	.0335	-.0449	.0366	-.0016	.0011	-.0075	.0002
18	707	3.57	-6.00	71.09	.0895	-.0466	.0357	-.0049	.0018	-.0086	.0004
18	708	3.57	-6.00	71.10	.0895	-.0466	.0355	-.0049	.0018	-.0087	.0004
18	709	7.79	-6.00	71.54	.2098	-.0477	.0345	-.0125	.0033	-.0116	-.0001
18	710	7.79	-6.00	71.54	.2098	-.0477	.0349	-.0125	.0037	-.0116	.0001
18	711	12.02	-6.00	70.37	.3180	-.0540	.0307	-.0173	.0056	-.0136	.0022
18	712	12.02	-6.00	70.40	.3179	-.0539	.0307	-.0173	.0057	-.0131	.0020
18	713	16.29	-6.00	68.45	.4399	-.0648	.0231	-.0127	.0032	-.0095	.0007
18	714	16.27	-6.00	68.37	.4389	-.0650	.0232	-.0128	.0032	-.0095	.0007
18	715	20.51	-6.00	67.47	.5562	-.0666	.0162	-.0102	.0032	-.0098	.0009
18	716	20.51	-6.00	67.48	.5561	-.0666	.0160	-.0103	.0031	-.0098	.0009
18	717	24.84	-6.00	66.78	.6809	-.0737	.0121	-.0090	.0058	-.0103	.0026
18	718	24.84	-6.00	66.78	.6830	-.0737	.0121	-.0092	.0058	-.0103	.0014
18	719	2 .57	-6.00	67.76	.5615	-.0678	.0184	-.0110	.0031	-.0089	.0011
18	720	20.57	-6.00	67.40	.5635	-.0678	.0187	-.0113	.0031	-.0090	.0011
18	721	7.79	-6.00	71.45	.2079	-.0477	.0351	-.0122	.0032	-.0115	-.0001
18	722	7.79	-6.00	71.42	.2080	-.0486	.0351	-.0122	.0033	-.0116	.0002

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
18	697	-.63	-6.00	83.86	-.5339	-.0224	-.0404	.0419
18	698	-.63	-6.00	83.99	-.5109	-.0214	-.0404	.0419
18	699	-4.84	-6.00	74.91	-2.5741	-.1348	-.0432	.0524
18	7	-4.84	-6.	74.91	-2.5825	-.1348	-.0443	.0522
18	701	-2.74	-6.00	76.64	-1.8076	-.1015	-.0412	.0445
18	702	-2.74	-6.00	76.59	-1.7841	-.0795	-.0422	.0446
18	703	-.64	-6.00	83.32	-.5597	-.0235	-.0404	.0419
18	704	-.63	-6.	83.87	-.53 2	-. 224	-. 4 4	. 422
18	705	1.47	-6.00	57.28	.7770	.0325	-. 407	. 419
18	706	1.47	-6.00	67.28	.7770	.0325	-.0407	.0419
18	707	3.57	-6.00	71.09	1.8992	.0971	-.0420	.0459
18	708	3.57	-6.00	71.10	1.9114	. 972	-. 42	. 456
18	7 9	7.79	-6.00	71.54	3.0185	.2032	-.0409	.0673
13	710	7.79	-6.00	71.54	3.0155	.2031	-. 409	.0676
18	711	12.02	-6.00	70.37	3.0064	.3046	-.0436	.1013
18	712	12.02	-6.00	70.40	3.0031	.3045	-.0445	.1014
18	713	16.29	-6.	68.45	2.7616	.4157	-.0394	.1505
18	714	16.27	-6.00	68.37	2.7490	.4057	-.0399	.1474
18	715	20.51	-6.00	67.47	2.3750	.4955	-.0450	.2090
18	716	20.51	-6.00	67.43	2.3795	.4965	-.0451	.2097
18	717	24.84	-6.	66.75	2. 2 7	.6129	-. 442	. 3 3
18	718	24.84	-6.00	66.78	2.0209	.6147	-.0441	.3042
18	719	2 .57	-6.00	67.76	2.3557	.5103	-.0450	.2204
18	720	20.57	-6.00	67.40	2.3534	.5210	-.0449	.2214
18	721	7.79	-6.00	71.45	2.9753	.2 12	-. 4 8	. 675
18	722	7.79	-6.00	71.42	2.9718	.2013	-.0418	.0677

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CI	CZ	CX	CM
19	749	-.66	[illegible]	83.95	-.0413	-.0073	.0329	.0076	.0001	.0004	.5490
19	750	-.66	0.00	83.94	-.0413	-.0083	.0323	.0076	.0032	.0004	.5490
19	751	-4.85	0.00	76.09	-.1578	-.0077	.0325	.0136	.0001	.0005	.5494
19	752	-4.85	0.00	76.09	-.1557	-.0078	.0328	.0154	.0002	.0007	.5495
19	753	-2.75	[illegible]	79.01	-.0958	-.0075	.0328	.0119	.0001	.0005	.5516
19	754	-2.75	0.00	79.01	-.0958	-.0075	.0328	.0119	.0001	.0004	.5509
19	755	-.66	0.00	84.25	-.0402	-.0054	.0326	.0075	-.0001	.0005	.5490
19	756	-.66	0.00	84.34	-.0392	-.0063	.0325	.0074	-.0000	.0005	.5490
19	757	1.44	[illegible]	37.53	.0125	-.0065	.0318	.0035	-.0002	.0007	.5496
19	758	1.44	0.00	37.54	.0127	-.0066	.0319	.0035	-.0002	.0008	.5496
19	759	3.54	0.00	65.78	.0835	-.0079	.0302	-.0001	-.0000	.0007	.5508
19	760	3.54	0.00	65.78	.0835	-.0088	.0302	-.0001	.0001	.0006	.5490
19	761	7.76	[illegible]	69.45	.1815	-.0091	.0261	-.0007	.0002	.0006	.5476
19	762	7.76	0.00	69.45	.1815	-.0092	.0261	-.0008	.0003	.0005	.5476
19	763	11.93	0.00	69.63	.2854	-.0084	.0194	-.0120	.0004	.0007	.5474
19	764	11.93	0.00	69.66	.2804	-.0084	.0193	-.0121	.0005	.0003	.5471
19	765	15.25	0.00	69.37	.4079	-.0093	.0083	-.0158	.0001	-.0001	.5465
19	766	15.25	[illegible]	69.30	.4279	-.0093	.0083	-.0150	.0010	-.0001	.5483
19	767	20.56	0.00	68.49	.5671	-.0102	-.0021	-.0155	.0014	-.0005	.5491
19	768	20.56	0.00	68.51	.5681	.0008	-.0021	-.0157	.0013	-.0006	.5481
19	769	24.88	0.00	67.42	.7004	.0115	-.0095	-.0151	.0029	-.0010	.5496
19	770	24.88	[illegible]	67.39	.7074	.0113	-.0099	-.0129	.0030	-.0009	.5497
19	771	20.55	0.00	68.48	.5637	.0015	-.0027	-.0164	.0013	-.0005	.5476
19	772	20.55	0.00	68.50	.5647	.0017	-.0027	-.0165	.0012	-.0006	.5471
19	773	7.75	0.00	69.35	.1807	-.0092	.0261	-.0058	-.0000	.0005	.5481
19	774	7.75	[illegible]	69.39	.1815	-.0081	.0261	-.0059	-.0001	.0003	.5487

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
19	749	-.65	0.00	83.95	-1.2278	-.0409	-.0073	.0313
19	750	-.66	0.00	83.94	-1.2481	-.0419	-.0093	.0328
19	751	-4.86	0.00	76.09	-3.3748	-.1545	-.0077	.0458
19	752	-4.85	0.00	76.09	-3.3735	-.1524	-.0078	.0458
19	753	-2.75	0.00	78.01	-2.5195	-.0941	-.0075	.0373
19	754	-2.75	0.00	78.01	-2.5199	-.0941	-.0075	.0373
19	755	-.65	0.00	84.26	-1.2151	-.0399	-.0064	.0330
19	756	-.65	0.00	84.34	-1.1777	-.0388	-.0063	.0330
19	757	1.44	0.00	37.53	.3503	.0118	-.0065	.0321
19	758	1.44	0.00	37.54	.3504	.0118	-.0065	.0321
19	759	3.54	0.00	65.78	1.8851	.0645	-.0079	.0342
19	760	3.54	0.00	65.78	1.8848	.0645	-.0078	.0342
19	761	7.76	0.00	69.45	3.5025	.1763	-.0091	.0503
19	762	7.76	0.00	69.45	3.5026	.1763	-.0092	.0503
19	763	11.98	0.00	69.65	3.5502	.2951	-.0084	.0813
19	764	11.98	0.00	69.66	3.5532	.2959	-.0084	.0805
19	765	16.25	0.00	69.27	3.2956	.4076	-.0022	.1275
19	766	16.25	0.00	69.30	3.1970	.4085	-.0023	.1278
19	767	20.56	0.00	68.49	2.8076	.5318	-.0002	.1971
19	768	20.56	0.00	68.51	2.8075	.5326	.0003	.1975
19	769	24.88	0.00	67.42	2.2347	.6475	.0115	.2838
19	770	24.88	0.00	67.39	2.2375	.6459	.0103	.2885
19	771	20.55	0.00	68.48	2.7067	.5288	.0006	.1954
19	772	20.55	0.00	68.5	2.7065	.5287	.0017	.1957
19	773	7.75	0.00	69.35	3.4939	.1755	-.0092	.0502
19	774	7.75	0.00	69.39	3.4928	.1754	-.0081	.0502

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPS
22	877	-.65	-6.00	85.42	-.0359	-.0426	.0317	.0071	.0013	-.0008	.0033
22	878	-.65	-6.00	85.05	-.0369	-.0427	.0320	.0072	.0013	-.0007	.0036
22	879	-4.86	-6.00	76.08	-.1543	-.0439	.0319	.0162	.0019	.0012	.0585
22	880	-4.86	-6.00	76.10	-.1532	-.0449	.0319	.0161	.0019	.0011	.0569
22	881	-2.75	-6.00	78.03	-.0955	-.0429	.0318	.0119	.0015	.0003	.0304
22	882	-2.75	-6.00	78.00	-.0946	-.0429	.0318	.0118	.0015	.0002	.0297
22	883	-.65	-6.00	86.14	-.0346	-.0407	.0317	.0071	.0010	-.0006	.0033
22	884	-.65	-6.00	85.42	-.0358	-.0417	.0314	.0071	.0011	-.0007	.0048
22	885	1.44	-6.00	42.69	.0150	-.0421	.0308	.0034	.0012	-.0015	-.0160
22	886	1.44	-6.00	45.06	.0159	-.0422	.0305	.0033	.0012	-.0015	-.0144
22	887	3.53	-6.00	66.05	.0707	-.0410	.0285	-.0003	.0016	-.0024	-.0166
22	888	3.55	-6.00	66.05	.0707	-.0410	.0285	-.0003	.0016	-.0024	-.0173
22	889	7.76	-6.00	69.14	.1825	-.0465	.0237	-.0065	.0033	-.0043	.0053
22	890	7.76	-6.00	69.19	.1825	-.0466	.0234	-.0066	.0033	-.0041	.0030
22	891	11.99	-6.00	69.37	.2976	-.0509	.0150	-.0113	.0051	-.0060	-.0009
22	892	11.99	-6.00	69.37	.2976	-.0508	.0150	-.0113	.0051	-.0060	-.0003
22	893	16.25	-6.00	68.94	.4247	-.0520	.0053	-.0143	.0041	-.0067	-.0332
22	894	16.25	-6.00	68.95	.4236	-.0531	.0053	-.0143	.0042	-.0067	-.0348
22	895	20.54	-6.00	68.26	.5585	-.0584	-.0047	-.0150	.0026	-.0083	-.0192
22	896	20.55	-6.00	68.25	.5596	-.0563	-.0047	-.0150	.0024	-.0083	-.0225
22	897	24.89	-6.00	67.20	.7091	-.0530	-.0095	-.0116	.0023	-.0112	-.0694
22	898	24.88	-6.00	67.21	.7056	-.0524	-.0092	-.0116	.0020	-.0100	-.0678
22	899	20.55	-6.00	68.33	.5637	-.0595	-.0050	-.0155	.0026	-.0082	-.0221
22	900	20.55	-6.00	68.35	.5647	-.0585	-.0051	-.0157	.0025	-.0082	-.0228
22	901	7.76	-6.00	69.14	.1826	-.0465	.0240	-.0065	.0032	-.0042	-.0004
22	902	7.76	-6.00	69.21	.1837	-.0486	.0237	-.0067	.0034	-.0043	-.0010

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
22	877	-.65	-6.00	85.42	-.9760	-.0355	-.0390	.0364
22	878	-.65	-6.00	85.35	-.9971	-.0366	-.0391	.0357
22	879	-4.86	-6.00	76.08	-3.0718	-.1511	-.0390	.0492
22	880	-4.86	-6.00	76.10	-3.0498	-.1500	-.0400	.0492
22	881	-2.75	-6.00	78.03	-2.3107	-.0939	-.0338	.0406
22	882	-2.75	-6.00	78.00	-2.2906	-.0929	-.0388	.0456
22	883	-.65	-6.00	86.14	-.9485	-.0343	-.0372	.0361
22	884	-.65	-6.00	85.42	-.9851	-.0355	-.0382	.0360
22	885	1.44	-6.00	42.69	.4004	.0142	-.0386	.0364
22	886	1.44	-6.00	45.06	.4316	.0152	-.0397	.0362
22	887	3.55	-6.00	66.05	1.8629	.0688	-.0773	.0269
22	888	3.55	-6.00	66.05	1.8627	.0688	-.0773	.0269
22	889	7.75	-6.00	69.14	3.3720	.1777	-.0412	.0527
22	890	7.76	-6.00	69.19	3.3684	.1777	-.0414	.0524
22	891	11.99	-6.00	69.37	3.5359	.2879	-.0426	.0814
22	892	11.99	-6.00	69.37	3.5361	.2879	-.0426	.0814
22	893	16.26	-6.00	68.94	3.1547	.4063	-.0388	.1218
22	894	16.25	-6.00	68.95	3.1516	.4052	-.0399	.1286
22	895	20.54	-6.00	68.26	2.6683	.5246	-.0381	.1956
22	896	20.55	-6.00	68.25	2.5712	.5256	-.0359	.1968
22	897	24.89	-6.00	67.20	2.2031	.6472	-.0224	.2938
22	898	24.88	-6.00	67.21	2.2020	.6440	-.0220	.2925
22	899	20.55	-6.00	68.33	2.6700	.5296	-.0391	.1984
22	900	20.55	-6.00	68.35	2.6715	.5305	-.0380	.1985
22	901	7.75	-6.00	69.14	3.3535	.1777	-.0412	.0530
22	902	7.75	-6.00	69.21	3.3691	.1788	-.0433	.0531

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
23	918	-.65	6.00	82.27	-.0416	.0445	.0313	.0070	-.0023	.0018	-.0059
23	919	-.66	6.00	82.28	-.0417	.0456	.0316	.0070	-.0023	.0018	-. 68
23	92	-4.86	6.[illegible]	75.51	-.1559	.0513	.0318	.0155	-.0035	.0001	.0439
23	921	-4.85	6.00	75.51	-.1559	.0513	.0318	.0155	-.0035	.0001	.0456
23	922	-2.75	6.00	77.16	-.0926	.0464	.0317	.0107	-.0026	.0010	.0199
23	923	-2.75	6.00	77.22	-.0915	.0474	.0317	.0107	-.0027	.0010	.0182
23	924	-.65	6.[illegible]	82.12	-. [illegible]89	.[illegible]445	.[illegible]313	.[illegible]064	-.[illegible]22	.[illegible]17	-.0047
23	925	-.65	6.00	82.40	-.0378	.0446	.0313	.0064	-.0022	.0017	-.0052
23	926	1.45	6.00	53.47	.0189	.0464	.0304	.0023	-.0027	.0025	-.0071
23	927	1.45	6.00	53.48	.0189	.0464	.0304	.0023	-.0027	.0025	-.0041
23	928	3.55	6.00	66.99	.0702	.0481	.0292	-.[illegible]10	-.[illegible]32	.[illegible]34	-. [illegible]97
23	929	3.55	6.[illegible]	67.20	.0712	.0471	.0288	-.0012	-.0031	.0034	-.0399
23	930	7.75	6.00	69.76	.1786	.0515	.0236	-.0074	-.0045	.0052	.0014
23	931	7.75	6.00	69.70	.1786	.0514	.0239	-.0074	-.0045	.0052	.0037
23	932	11.99	6.00	69.74	.3013	.0592	.0157	-.0126	-.0054	.0068	-. 12
23	933	12.[illegible]	6.[illegible]	69.75	.[illegible]24	.[illegible]61	.[illegible]16[illegible]	-.0126	-.0055	.0069	-.0119
23	934	16.27	6.00	69.22	.4237	.0644	.0160	-.0158	-.0043	.[illegible]076	-.0457
23	935	16.26	6.00	69.19	.4306	.0642	.0160	-.0156	-.0044	.0077	-.0474
23	936	20.57	6.00	69.51	.5713	.0764	-.0052	-.0158	-.0018	.0075	-.0536
23	937	20.56	6.[illegible]	68.5[illegible]	.563[illegible]	.[illegible]753	-.[illegible]52	-.[illegible]167	-.[illegible]18	.[illegible]75	-. 538
23	938	24.90	6.00	67.43	.7167	.0835	-.0094	-.0133	.[illegible]103	.[illegible]102	-.[illegible]728
23	939	24.90	6.00	67.45	.7177	.0836	-.0097	-.0135	.0003	.0101	-.0723
23	940	20.55	6.00	68.47	.5636	.0744	-.0055	-.0164	-.0017	.0074	-.0498
23	941	20.55	6.00	68.50	.5647	.0743	-.[illegible]55	-.[illegible]165	-.[illegible]18	.[illegible]74	-.[illegible]522
23	942	7.76	6.00	69.65	.1820	.0537	.0236	-.0074	-.0046	.0052	.0065
23	943	7.76	6.00	69.65	.1820	.0537	.0236	-.0074	-.0046	.0052	.0058

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
23	918	-.66	6.00	82.27	-1.1377	-.0413	.0409	.0363
23	919	-.66	6.00	82.28	-1.1274	-.0414	.0420	.0367
23	920	-4.85	6.00	75.51	-3.0552	-.1527	.0463	.0500
23	921	-4.85	6.00	75.51	-3.0552	-.1527	.0463	.0500
23	922	-2.75	6.00	77.16	-2.2316	-.0911	.0423	.0408
23	923	-2.75	6.00	77.22	-2.2916	-.0899	.0433	.0408
23	924	-.65	6.00	82.12	-1.0536	-.0385	.0410	.0362
23	925	-.65	6.00	82.40	-1.0344	-.0374	.0410	.0362
23	926	1.45	6.00	53.47	.5091	.0181	.0429	.0356
23	927	1.45	6.00	53.48	.5094	.0181	.0429	.0356
23	928	3.55	6.00	66.99	1.7825	.0632	.0444	.0343
23	929	3.55	6.00	67.20	1.8259	.0693	.0434	.0379
23	930	7.75	6.00	69.70	3.3019	.1738	.0462	.0526
23	931	7.75	6.00	69.71	3.2839	.1738	.0462	.0529
23	932	11.99	6.00	69.74	3.4800	.2915	.0507	.0838
23	933	12.00	6.00	69.75	3.4669	.2925	.0515	.0844
23	934	16.27	6.00	69.22	3.1120	.4147	.0508	.1333
23	935	16.26	6.00	69.19	3.1168	.4117	.0507	.1323
23	936	20.57	6.00	68.51	2.6471	.5357	.0555	.2027
23	937	20.56	6.00	68.50	2.6492	.5336	.0546	.2014
23	938	24.91	6.00	67.43	2.1791	.6541	.0524	.3003
23	939	24.90	6.00	67.45	2.1801	.6551	.0525	.3005
23	940	20.55	6.00	68.47	2.6562	.5297	.0538	.1995
23	941	20.55	6.00	68.50	2.6552	.5306	.0537	.1998
23	942	7.76	6.00	69.65	3.3218	.1771	.0484	.0533
23	943	7.76	6.00	69.65	3.3221	.1771	.0484	.0533

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
24	959	-.62	6.00	75.14	-.0120	.0470	.0309	.0012	-.0034	-.0011	-.0076
24	960	-.62	6.00	74.63	-.0111	.0470	.0309	.0010	-.0034	-.0011	-.0067
24	961	-4.82	6.00	72.56	-.1223	.0535	.0298	.0086	-.0050	-.0032	.0421
24	962	-4.81	6.00	72.64	-.1200	.0536	.0297	.0085	-.0050	-.0033	.0411
24	963	-2.72	6.00	73.12	-.0661	.0498	.0308	.0050	-.0040	-.0022	.0193
24	964	-2.72	6.00	73.12	-.0661	.0498	.0308	.0050	-.0040	-.0021	.0179
24	965	-.62	6.00	74.32	-.0133	.0470	.0315	.0012	-.0034	-.0011	-.0061
24	966	-.62	6.00	73.77	-.0123	.0470	.0312	.0010	-.0034	-.0011	-.0069
24	967	1.47	6.00	73.22	.0444	.0477	.0318	-.0031	-.0035	-.0004	-.0271
24	968	1.47	6.00	73.21	.0403	.0488	.0311	-.0071	-.0036	-.0005	-.0267
24	969	3.58	6.00	72.82	.0974	.0498	.0300	-.0071	-.0039	.0001	-.0404
24	970	3.58	6.00	72.83	.0974	.0488	.0300	-.0071	-.0039	.0001	-.0399
24	971	7.80	6.00	72.51	.2182	.0539	.0263	-.0151	-.0049	.0014	.0022
24	971	7.80	6.00	72.51	.2182	.0539	.0263	-.0151	-.0049	.0014	.0022
24	972	12.04	6.00	71.61	.3416	.0559	.0236	-.0216	-.0062	.0025	-.0171
24	973	12.05	6.00	71.63	.3437	.0558	.0208	-.0208	-.0051	.0026	-.0160
24	974	15.30	6.00	70.33	.4635	.0569	.0147	-.0221	-.0026	.0045	-.0521
24	975	15.31	6.00	70.33	.4635	.0569	.0144	-.0221	-.0026	.0046	-.0517
24	976	20.59	6.00	69.05	.5901	.0559	.0073	-.0205	.0000	.0066	-.0581
24	977	20.59	6.00	69.05	.5901	.0559	.0073	-.0205	.0000	.0065	-.0572
24	978	24.89	6.00	67.48	.7156	.0704	.0043	-.0136	.0022	.0118	-.0936
24	979	24.89	6.00	67.50	.7176	.0714	.0043	-.0139	.0022	.0119	-.0946
24	980	20.58	6.00	69.01	.5836	.0549	.0073	-.0201	.0002	.0065	-.0617
24	981	20.58	6.00	69.01	.5859	.0550	.0073	-.0201	.0001	.0065	-.0598
24	982	7.80	6.00	72.44	.2163	.0519	.0263	-.0149	-.0048	.0013	.0056
24	983	7.80	6.00	72.44	.2174	.0519	.0263	-.0149	-.0048	.0013	.0025

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
24	959	-.62	6.00	75.14	-.3254	-.0117	.0435	.0358
24	960	-.62	6.00	74.63	-.2997	-.0107	.0435	.0358
24	961	-4.82	6.00	72.56	-2.6348	-.1194	.0490	.0453
24	962	-4.81	6.00	72.64	-2.5964	-.1171	.0491	.0451
24	963	-2.72	6.00	73.12	-1.6597	-.0645	.0460	.0389
24	964	-2.72	6.00	73.12	-1.6597	-.0645	.0460	.0389
24	965	-.62	6.00	74.32	-.3553	-.0129	.0434	.0354
24	966	-.62	6.00	73.77	-.3314	-.0120	.0434	.0361
24	967	1.47	6.00	73.22	1.0807	.0395	.0441	.0356
24	968	1.47	6.00	73.21	1.0678	.0395	.0452	.0370
24	969	3.58	6.00	72.82	2.3312	.0954	.0447	.0409
24	970	3.53	6.00	72.83	2.3311	.0954	.0448	.0409
24	971	7.80	6.00	72.51	3.4877	.2126	.0478	.0610
24	971	7.80	6.00	72.51	3.4837	.2126	.0478	.0610
24	972	12.04	6.00	71.61	3.4090	.3298	.0461	.0967
24	973	12.05	6.00	71.63	3.4147	.3318	.0459	.0974
24	974	15.30	6.00	70.33	2.9510	.4408	.0416	.1404
24	975	15.30	6.00	70.33	2.9569	.4408	.0416	.1401
24	976	20.59	6.00	69.05	2.4985	.5499	.0432	.2201
24	977	20.59	6.00	69.05	2.4985	.5499	.0432	.2201
24	978	24.89	6.00	67.48	2.0828	.6473	.0381	.3108
24	979	24.89	6.00	67.50	2.0820	.6491	.0390	.3118
24	980	20.58	6.00	69.01	2.4990	.5438	.0424	.2176
24	981	20.58	6.00	69.01	2.4979	.5459	.0434	.2185
24	982	7.80	6.00	72.44	3.4806	.2107	.0458	.0606
24	983	7.80	6.00	72.44	3.4900	.2118	.0458	.0607

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPS
25	999	-.61	3.00	81.74	-.0090	.0207	.0314	.0015	-.0014	-.0016	.0144
25	0	-.61	3.00	80.70	-.0101	.0207	.0314	.0015	-.0014	-.0017	.0139
25	1	-4.81	3.00	73.62	-.1214	.0246	.0295	.0091	-.0028	-.0032	.0519
25	2	-4.81	3.00	73.63	-.1214	.0246	.0295	.0091	-.0028	-.0032	.0513
25	3	-2.72	3.00	73.77	-.0676	.0233	.0306	.0055	-.0020	-.0025	.0322
25	4	-2.72	3.00	73.77	-.0676	.0233	.0306	.0055	-.0020	-.0025	.0330
25	5	-.62	3.00	77.41	-.0116	.0197	.0311	.0014	-.0013	-.0018	.0147
25	6	-.62	3.00	77.41	-.0116	.0197	.0311	.0014	-.0013	-.0017	.0138
25	7	1.48	3.00	71.25	.0407	.0208	.0310	-.0023	-.0017	-.0013	.0006
25	8	1.48	3.00	71.26	.0407	.0208	.0310	-.0023	-.0017	-.0013	.0012
25	9	3.58	3.00	72.29	.0984	.0244	.0319	-.0036	-.0023	-.0013	-.0179
25	10	3.58	3.00	72.29	.0984	.0244	.0306	-.0036	-.0023	-.0012	-.0192
25	11	7.81	3.00	72.36	.2207	.0246	.0273	-.0150	-.0024	-.0009	.0561
25	12	7.80	3.00	72.36	.2196	.0247	.0274	-.0149	-.0025	-.0010	.0541
25	13	12.05	3.00	71.72	.3434	.0271	.0227	-.0211	-.0020	-.0008	.0906
25	14	12.05	3.00	71.72	.3434	.0271	.0227	-.0211	-.0020	-.0007	.0909
25	15	15.32	3.00	72.46	.4703	.0310	.0146	-.0230	-.0003	.0003	-.0148
25	16	15.32	3.00	70.45	.4704	.0310	.0143	-.0229	-.0004	.0003	-.0163
25	17	20.59	3.00	69.06	.5925	.0403	.0068	-.0207	.0013	.0020	-.0445
25	18	20.59	3.00	69.08	.5924	.0403	.0071	-.0208	.0013	.0020	-.0429
25	19	24.90	3.00	67.45	.7177	.0388	.0022	-.0135	.0021	.0073	-.0980
25	20	24.89	3.00	67.45	.7165	.0390	.0022	-.0135	.0021	.0077	-.0869
25	21	20.59	3.00	69.11	.5932	.0402	.0068	-.0210	.0013	.0020	-.0386
25	22	20.59	3.00	69.13	.5942	.0392	.0068	-.0211	.0014	.0019	-.0385
25	23	7.80	3.00	72.28	.2177	.0246	.0274	-.0146	-.0024	-.0009	.0825
25	24	7.80	3.00	72.32	.2187	.0246	.0274	-.0148	-.0024	-.0009	.0805

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
25	999	-.61	3.00	81.74	-.2663	-.0087	.0190	.0325
25	0	-.61	3.00	80.70	-.3002	-.0098	.0190	.0326
25	1	-4.81	3.00	73.02	-2.9005	-.1185	.0225	.0409
25	2	-4.81	3.00	73.03	-2.9005	-.1185	.0224	.0409
25	3	-2.72	3.00	73.77	-1.8891	-.0561	.0215	.0350
25	4	-2.72	3.00	73.77	-1.8890	-.0561	.0215	.0350
25	5	-.62	3.00	77.40	-.3492	-.0113	.0181	.0322
25	6	-.62	3.00	77.41	-.3492	-.0113	.0180	.0322
25	7	1.48	3.00	71.25	1.2046	.0399	.0191	.0331
25	8	1.48	3.00	71.26	1.2045	.0398	.0191	.0331
25	9	3.58	3.00	72.29	2.5217	.0962	.0224	.0372
25	10	3.58	3.00	72.29	2.5411	.0963	.0224	.0379
25	11	7.81	3.00	72.36	3.5680	.2150	.0216	.0583
25	12	7.80	3.00	72.36	3.6795	.2139	.0216	.0581
25	13	12.05	3.00	71.72	3.4810	.3311	.0222	.0951
25	14	12.05	3.00	71.72	3.4811	.3311	.0221	.0951
25	15	16.32	3.00	70.46	3.0317	.4472	.0233	.1475
25	16	16.32	3.00	70.45	3.0779	.4475	.0233	.1473
25	17	20.59	3.00	69.06	2.5496	.5522	.0290	.2156
25	18	20.59	3.00	69.08	2.5662	.5520	.0290	.2158
25	19	24.90	3.00	67.45	2.1259	.6501	.0229	.3058
25	20	24.89	3.00	67.45	2.1261	.6489	.0230	.3052
25	21	20.59	3.00	69.11	2.5499	.5529	.0289	.2168
25	22	20.59	3.00	69.13	2.5506	.5539	.0279	.2171
25	23	7.80	3.00	72.28	3.6525	.2120	.0216	.0579
25	24	7.81	3.00	72.32	3.6716	.2129	.0216	.0584

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
26	40	-.63	.00	80.25	-.0189	.0052	.0303	.0028	-.0013	-.0022	.0175
26	41	-.63	0.00	80.25	-.0189	.0052	.0303	.0028	-.0013	-.0022	.0174
26	42	-4.83	0.00	73.37	-.1284	.0073	.0289	.0100	-.0020	-.0029	.0548
26	43	-4.83	0.00	73.38	-.1285	.0083	.0292	.0100	-.0020	-.0028	.0546
26	44	-2.73	.00	74.64	-.0741	.0032	.0301	.0057	-.0013	-.0025	.0339
26	45	-2.73	0.00	74.64	-.0742	.0032	.0301	.0057	-.0013	-.0026	.0344
26	46	-.63	0.00	79.38	-.0201	.0031	.0309	.0028	-.0011	-.0022	.0178
26	47	-.63	0.00	79.76	-.0190	.0031	.0309	.0027	-.0011	-.0022	.0182
26	48	1.46	0.00	68.63	.0297	.0027	.0303	-.0009	-.0011	-.0023	.0077
26	49	1.46	0.00	68.64	.0297	.0028	.0303	-.0009	-.0011	-.0024	.0065
26	50	3.57	0.00	71.73	.0893	.0048	.0302	-.0055	-.0013	-.0026	.0029
26	51	3.57	0.00	71.83	.0894	.0047	.0302	-.0054	-.0013	-.0026	.0037
26	52	7.79	0.00	72.11	.2115	.0053	.0278	-.0138	-.0011	-.0033	.0541
26	53	7.79	.00	72.11	.2115	.0053	.0278	-.0138	-.0011	-.0033	.0532
26	54	12.04	0.00	71.48	.3366	.0057	.0221	-.0199	-.0004	-.0037	.1284
26	56	16.30	0.00	70.47	.4526	.0069	.0147	-.0226	.0012	-.0036	.0660
26	57	16.30	0.00	70.46	.4514	.0061	.0147	-.0226	.0012	-.0037	.0669
26	59	20.57	.00	68.94	.5786	.0121	.0076	-.0195	.0010	-.0019	.0358
26	60	20.57	0.00	68.95	.5807	.0121	.0076	-.0196	.0010	-.0018	.0337
26	61	24.87	0.00	67.15	.7001	.0149	.0022	-.0110	.0038	.0018	-.0705
26	62	24.87	0.00	67.15	.7011	.0150	.0022	-.0111	.0038	.0018	-.0692
26	63	20.57	0.00	68.94	.5796	.0111	.0076	-.0195	.0011	-.0019	.0379
26	64	20.57	0.00	68.94	.5795	.0121	.0076	-.0195	.0009	-.0018	.0349
26	65	7.79	0.00	72.03	.2106	.0073	.0280	-.0136	-.0014	-.0032	.0781
26	65	7.79	0.00	72.03	.2105	.0073	.0280	-.0135	-.0014	-.0032	.0791
26	66	-.63	0.00	80.32	-.0189	.0060	.0312	.0028	-.0015	-.0021	.0225

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
25	40	-.63	0.00	80.25	-.6091	-.0186	.0052	.0305
25	41	-.63	0.00	80.25	-.6090	-.0186	.0052	.0305
26	42	-4.83	[illegible]	73.37	-3.1713	-.1256	.0073	.0396
26	43	-4.83	0.00	73.38	-3.1494	-.1256	.0083	.0399
26	44	-2.73	0.00	74.64	-2.1615	-.0725	.0032	.0335
25	45	-2.73	0.00	74.64	-2.1617	-.0725	.0032	.0335
26	46	-.63	[illegible]	79.78	-.6338	-.0197	.0031	.0311
25	47	-.63	0.00	79.78	-.5989	-.0186	.0031	.0311
25	48	1.46	0.00	68.63	.9288	.0289	.0027	.0311
26	49	1.46	0.00	68.64	.9287	.0289	.0028	.0311
26	50	3.57	0.00	71.73	2.4410	.0972	.0048	.0357
25	51	3.57	0.00	71.63	2.4435	.0873	.0047	.0357
25	52	7.79	0.00	72.11	3.6635	.2058	.0053	.0562
25	53	7.79	0.00	72.11	3.6635	.2058	.0053	.0562
25	54	12.04	0.00	71.48	3.5355	.3246	.0057	.0918
26	56	16.31	[illegible]	7 .47	3. 561	.4309	.0050	.1439
25	57	16.30	0.00	71.46	3.6555	.4383	.0061	.1476
26	59	20.57	0.00	68.94	2.5620	.5399	.0121	.2108
26	60	20.57	0.00	68.95	2.5619	.5410	.0121	.2112
26	61	24.87	[illegible]	67.15	2.1395	.6342	.0149	.2964
25	62	24.87	0.00	67.15	2.1394	.6352	.0150	.2969
26	63	20.57	0.00	68.94	2.5620	.5400	.0111	.2108
26	64	20.57	0.00	68.94	2.5620	.5400	.0121	.2108
26	65	7.79	0.00	72.03	3.6365	.2049	.0073	.0563
26	65	7.79	[illegible]	72.03	3.6365	.2049	.0073	.0563
26	66	-.63	0.00	80.32	-.5907	-.0185	.0060	.0314

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
27	81	-.62	-3.00	82.12	-.0139	-.0211	.0309	.0023	-.0004	-.0028	.0120
27	82	-.62	-3.00	82.12	-.0139	-.0211	.0309	.0023	-.0004	-.0028	.0107
27	83	-4.82	-3.00	73.59	-.1262	-.0250	.0291	.0101	-.0001	-.0025	.0539
27	84	-4.82	-3.00	73.59	-.1262	-.0250	.0291	.0101	-.0001	-.0025	.0541
27	85	-2.72	-3.00	74.99	-.0698	-.0226	.0301	.0066	-.0004	-.0026	.0321
27	86	-2.72	-3.00	74.98	-.0698	-.0226	.0301	.0056	-.0004	-.0025	.0288
27	87	-.63	-3.00	81.92	-.0159	-.0211	.0309	.0028	-.0004	-.0028	.0115
27	88	-.63	-3.00	81.91	-.0159	-.0211	.0309	.0028	-.0004	-.0028	.0098
27	89	1.47	-3.00	69.38	.0380	-.0228	.0313	-.0014	-.0001	-.0034	-.0075
27	90	1.47	-3.00	69.38	.0381	-.0228	.0313	-.0014	-.0001	-.0034	-.0070
27	91	3.57	-3.00	71.57	.0934	-.0251	.0303	-.0056	.0005	-.0042	-.0117
27	92	3.57	-3.00	71.58	.0934	-.0251	.0303	-.0056	.0005	-.0043	-.0111
27	93	7.80	-3.00	71.81	.2136	-.0269	.0285	-.0133	.0017	-.0059	.0844
27	94	7.80	-3.00	71.81	.2136	-.0269	.0283	-.0133	.0017	-.0058	.0821
27	95	12.03	-3.00	71.31	.3344	-.0281	.0236	-.0192	.0025	-.0070	.1445
27	96	12.04	-3.00	71.32	.3355	-.0290	.0239	-.0193	.0025	-.0071	.1443
27	97	16.31	-3.00	70.25	.4636	-.0317	.0161	-.0217	.0035	-.0068	.0988
27	98	16.31	-3.00	70.25	.4659	-.0315	.0150	-.0218	.0036	-.0068	.0691
27	99	20.57	-3.00	68.56	.5745	-.0290	.0083	-.0172	.0015	-.0042	-.0187
27	100	20.57	-3.00	68.57	.5756	-.0280	.0083	-.0172	.0015	-.0041	-.0200
27	101	24.83	-3.00	67.23	.7077	-.0371	.0051	-.0117	.0039	-.0039	-.0614
27	102	24.83	-3.00	67.22	.7078	-.0361	.0049	-.0117	.0038	-.0037	-.0610
27	103	20.57	-3.00	68.54	.5768	-.0287	.0083	-.0172	.0018	-.0042	-.0196
27	104	20.57	-3.00	68.57	.5778	-.0286	.0083	-.0173	.0018	-.0043	-.0200
27	5	7.80	-3.00	71.81	.2127	-.0302	.0283	-.0133	.0018	-.0058	.0842
27	106	7.80	-3.00	71.81	.2127	-.0312	.0286	-.0133	.0020	-.0058	.0834

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
27	81	-.62	-3.00	82.12	-.4243	-.0136	-.0195	.0321
27	82	-.62	-3.00	82.12	-.4242	-.0136	-.0195	.0321
27	83	-4.82	-3.00	73.59	-3.0195	-.1234	-.0229	.0409
27	84	-4.82	-3.00	73.59	-3.0196	-.1234	-.0229	.0409
27	85	-2.72	-3.00	74.99	-1.9761	-.0683	-.0208	.0345
27	86	-2.72	-3.00	74.98	-1.9763	-.0683	-.0208	.0345
27	87	-.63	-3.00	81.92	-.5145	-.0166	-.0194	.0322
27	88	-.63	-3.00	81.91	-.5146	-.0166	-.0194	.0322
27	89	1.47	-3.00	69.38	1.1118	.0372	-.0211	.0334
27	90	1.47	-3.00	69.38	1.1118	.0372	-.0211	.0334
27	91	3.57	-3.00	71.57	2.4436	.0913	-.0232	.0374
27	92	3.57	-3.00	71.58	2.4438	.0913	-.0231	.0374
27	93	7.80	-3.00	71.81	3.5457	.2078	-.0239	.0585
27	94	7.80	-3.00	71.81	3.5632	.2078	-.0239	.0583
27	95	12.03	-3.00	71.31	3.4213	.3221	-.0232	.0942
27	96	12.04	-3.00	71.32	3.4119	.3232	-.0241	.0947
27	97	16.30	-3.00	70.25	2.9974	.4405	-.0240	.1470
27	98	16.31	-3.00	70.25	2.9988	.4426	-.0239	.1476
27	99	20.57	-3.00	68.56	2.5379	.5350	-.0179	.2118
27	100	20.57	-3.00	68.57	2.5386	.5360	-.0170	.2112
27	101	24.83	-3.00	67.23	2.1053	.6399	-.0211	.3039
27	102	24.83	-3.00	67.22	2.1077	.6400	-.0202	.3037
27	103	20.57	-3.00	68.54	2.5380	.5371	-.0176	.2116
27	104	20.57	-3.00	68.57	2.5383	.5360	-.0175	.2120
27	5	7.80	-3.00	71.81	3.5444	.2069	-.0272	.0594
27	106	7.80	-3.00	71.81	3.5237	.2069	-.0281	.0587

BODY AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	CN	CY	CA	CM	CZ	CX	CPB
28	122	-.63	-6.00	83.54	-.0174	-.0417	.0312	.0031	.0007	-.0033	.0014
28	123	-.63	-6.00	81.31	-.0198	-.0428	.0310	.0031	.0008	-.0033	.0029
28	124	-4.83	-6.00	73.99	-.1287	-.0474	.0301	.0108	.0013	-.0023	.0526
28	125	-4.83	-6.00	73.99	-.1287	-.0474	.0301	.0108	.0013	-.0023	.0526
28	126	-2.72	-6.00	75.42	-.0714	-.0456	.0307	.0070	.0011	-.0028	.0278
28	127	-2.72	-6.00	75.34	-.0704	-.0456	.0307	.0069	.0011	-.0028	.0286
28	128	-.63	-6.00	82.00	-.0157	-.0428	.0312	.0026	.0006	-.0035	-.0001
28	129	-.62	-6.00	82.13	-.0147	-.0429	.0315	.0024	.0009	-.0034	.0014
28	130	1.47	-6.00	68.73	.0373	-.0421	.0309	-.0012	.0008	-.0043	-.0194
28	131	1.47	-6.00	68.83	.0384	-.0431	.0314	-.0013	.0009	-.0043	-.0198
28	132	3.57	-6.00	70.97	.0919	-.0445	.0303	-.0050	.0016	-.0056	-.0166
28	133	3.57	-6.00	70.97	.0919	-.0446	.0303	-.0050	.0017	-.0056	-.0144
28	134	7.79	-6.00	71.56	.2108	-.0483	.0276	-.0126	.0034	-.0081	.0057
28	135	7.80	-6.00	71.57	.2119	-.0473	.0276	-.0127	.0033	-.0081	.0033
28	136	12.04	-6.00	70.96	.3324	-.0483	.0223	-.0179	.0047	-.0101	-.0021
28	137	12.04	-6.00	70.96	.3320	-.0472	.0223	-.0179	.0046	-.0101	-.0023
28	138	16.31	-6.00	71.11	.4576	-.0524	.0155	-.0203	.0042	-.0098	-.0338
28	139	16.30	-6.00	70.81	.4576	-.0524	.0155	-.0203	.0042	-.0098	-.0349
28	140	20.53	-6.00	68.01	.5574	-.0543	.0090	-.0136	.0012	-.0065	-.0397
28	141	20.55	-6.00	68.03	.5585	-.0555	.0090	-.0138	.0012	-.0066	-.0416
28	142	24.87	-6.00	67.16	.7126	-.0629	.0047	-.0112	.0036	-.0085	-.0959
28	143	24.89	-6.00	67.18	.7068	-.0605	.0047	-.0114	.0037	-.0084	-.0975
28	144	20.54	-6.00	68.02	.5551	-.0528	.0084	-.0136	.0008	-.0064	-.0421
28	145	20.54	-6.00	68.06	.5558	-.0515	.0087	-.0138	.0009	-.0066	-.0417
28	146	7.79	-6.00	71.43	.2089	-.0464	.0270	-.0122	.0033	-.0079	.0022
28	147	7.79	-6.00	71.44	.2100	-.0463	.0270	-.0123	.0033	-.0080	.0004

WIND AXIS

MACH NUMBER= .19

RUN	TPN	ALPHA	YAW	C.P.	FL/FD	CL	CC	CD
28	122	-.63	-6.00	83.54	-.4795	-.0171	-.0382	.0356
28	123	-.63	-6.00	81.31	-.5487	-.0195	-.0393	.0355
28	124	-4.83	-6.00	73.99	-2.7580	-.1257	-.0429	.0456
28	125	-4.83	-6.00	73.99	-2.7581	-.1257	-.0429	.0456
28	126	-2.72	-6.00	75.42	-1.8093	-.0698	-.0418	.0386
28	127	-2.72	-6.00	75.34	-1.7859	-.0689	-.0418	.0385
28	128	-.63	-6.00	82.00	-.4292	-.0154	-.0403	.0358
28	129	-.62	-6.00	82.10	-.3988	-.0144	-.0403	.0360
28	130	1.47	-6.00	68.73	1.0117	.0365	-.0385	.0361
28	131	1.47	-6.00	68.83	1.0233	.0376	-.0394	.0367
28	132	3.57	-6.00	71.97	2.2222	.0868	-.0405	.0404
28	133	3.57	-6.00	72.07	2.2220	.0868	-.0406	.0404
28	134	7.79	-6.00	71.56	3.3820	.2052	-.0422	.0607
28	135	7.80	-6.00	71.57	3.3977	.2062	-.0412	.0607
28	136	12.04	-6.00	70.96	3.3494	.3201	-.0385	.0956
28	137	12.04	-6.00	70.96	3.3551	.3211	-.0374	.0955
28	138	16.30	-6.00	70.01	2.9392	.4349	-.0371	.1430
28	139	16.30	-6.00	70.01	2.9392	.4349	-.0371	.1430
28	140	20.55	-6.00	68.01	2.4870	.5188	-.0330	.2086
28	141	20.55	-6.00	68.03	2.4861	.5198	-.0339	.2091
28	142	24.87	-6.00	67.16	2.0853	.6354	-.0312	.3047
28	143	24.83	-6.00	67.18	2.0868	.6392	-.0287	.3063
28	144	20.54	-6.00	68.02	2.4963	.5169	-.0313	.2070
28	145	20.54	-6.00	68.06	2.4946	.5174	-.0300	.2074
28	146	7.79	-6.00	71.43	3.4183	.2133	-.0403	.0597
28	147	7.79	-6.00	71.44	3.4183	.2044	-.0403	.0598

VITA

Captain Robert M. Foley was born [redacted] He is the eldest of five sons and one daughter of [redacted] He graduated from [redacted] and entered the United States Air Force Academy in June of the same year. Captain Foley graduated from the Air Force Academy in 1963 with a Bachelor of Science degree in International Affairs and a commission as a Second Lieutenant in the Air Force. He attended pilot training at Williams Air Force Base, Arizona and received his pilot's wings in August 1964. He was assigned to the 3560th Pilot Training Wing at Webb Air Force Base, Texas where he served four years as an instructor pilot. In 1968 Captain Foley was assigned to the 119th Tactical Fighter Squadron at Myrtle Beach, South Carolina where he completed the F-100 gunnery school. He served in Viet Nam with the 31st Tactical Fighter Wing as a tactical fighter pilot from April 1969 to February 1970. He is a graduate of the Naval Aviation Instructor School, the Air Training Command Academic Instructor School, and the Squadron Officer School. Captain Foley entered the Air Force Institute of Technology in June 1970.

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